

The Indian Animal Sciences ABSTRACTS



**Indian Council of Agricultural Research
New Delhi**

The Indian Animal Sciences ABSTRACTS



Published by

Directorate of Information and Publications of Agriculture
Indian Council of Agricultural Research
Krishi Anusandhan Bhawan I,
Pusa, New Delhi 110012

Published : January 2011

Project Director (DIPA) : Dr T.P.Trivedi

Compilation and Technical Editing : Hans Raj

Information Systems Officer

Kiran Kochhar

Technical Officer

© 2011, Indian Council of Agricultural Research, New Delhi

Published by Dr T.P. Trivedi, Project Director, Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, Krishi Anusandhan Bhawan I, Pusa, New Delhi 110012

SAMPLE ENTRY

1 ← 001 Paul, P.R.C.; Xavier, F.; Leena, A. (College of Veterinary and Animal Sciences, Trissur (India), Department, of Livestock Production Management) Dairysoft: A computer programme for dairy farms. Indian Journal of Animal Sciences (India). (Mar 2006).v. 76(3) p. 260-262 KEYWORDS: DAIRY FARMS; COMPUTER SOFTWARE

2
3
4
5
6

To exploit the full potential of dairy sector, a computerized record management system dairysoft was developed. Visual Basis 6.0 was used as front end while MSAccess 97 was utilized as back end for the software. The menu base dairysoft was provided with facilities for obtaining necessary reports along with separate data entry options.

1. Entry number
2. Author(s)
3. Title in English
4. Source
5. Keywords
6. Organisation where work was carried out

C20 Extension

0240. Meena, M.S.; National Dairy Research Institute, Karnal, (India) Malik, B.S.; National Dairy Research Institute, Karnal, (India). Participatory identification of reproductive problems among dairy animals and constraints faced by farmers in Haryana. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1172–1175 keywords: constraints. Dairy cattle. Reproductive performance.

The study investigates the prominent reproductive problems among dairy animals and associated constraints in its medication. Study was undertaken in 12 villages of Karnal district (Haryana) in participatory mode. Responses were obtained from 300 dairy farmers who had at least one milch cattle. Results revealed that repeat breeding followed by anoestrus was observed as prominent reproductive problems. Mostly farmers had faced medium level of reproductive problems (74.33%). The major identified constraints were lack of facility of doctors during night, high incidence of repeat breeding, and lack of good quality bulls at village level. Mostly respondents faced medium level of constraints (61.67%) in medication of these reproductive problems. There is need of an efficient extension setup, well equipped with know-how, and with solid infrastructural back up which can cater the needs of dairy farmers. Imparting quality practical training and periodical assessment of performance of lay inseminators will improve their skill and knowledge level. Extension machinery has to be an ideal bridge between research/development institutions and dairy farmers for their catalytic effect.

L01 Animal Husbandry

0241. Dutt, Trivem; Indian Veterinary Research Institute, Izatnagar (India)Sinha, R R K; Indian Veterinary Research Institute, Izatnagar (India)R R Singh; Indian Veterinary Research Institute, Izatnagar (India)Kumar, Sanjay; Indian Veterinary Research Institute, Izatnagar (India)BhushanBharat; Indian Veterinary Research Institute, Izatnagar (India)Singh, Mukesh; Indian Veterinary Research Institute, Izatnagar (India). Economics of milk production under field condition. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.706-709 keywords: milk production. Economics. Cost analysis. Profitability.

A study on cost of milk production was undertaken in a Tahsil of Bareilly district of Uttar Pradesh. The data related to milk production were collected from 270 dairy farmers from rural, semi-urban and urban areas in the categories of landless, marginal, small, medium and large farmers. The cost per litre of milk production in rural areas was Rs 10.3, 10.4, 9.9, 11.1 and 11.8 for landless, marginal, small, medium and large farmers respectively. In semi-urban areas the cost per litre of milk production was Rs 9.5, 11.4, 9.8 and 11.7 for landless, marginal, small and medium farmers while than in urban areas, was Rs 14.1, 11.7, 14.5, 14.3 and 14.6 for landless, marginal, small, medium and large farmers, respectively. Profit per litre of milk was Rs 1.4, 1.1, 2.4, 0.8 and 0.7 for landless, marginal, small, medium and large farmers in rural areas, respectively. This profit was more in semi-urban areas, where it was Rs 3.3, 1.9, 2.2 and 1.8 for landless, marginal, small and medium farmers, whereas in urban areas per litre profit was Rs 1.8, 3.2, 1.6, 1.8 and 0.8 for landless, marginal, small, medium and large farmers respectively. Total variable cost was maximum (90%) in semiurban areas followed by rural (89%) and urban areas (86%).

0242. Mehta, S C; National Research Centre on Camel, Bikaner (India) Pathak, K M L; National Research Centre on Camel, Bikaner (India) Bhardwaj, B; National Research Centre on Camel, Bikaner (India)Arora, S; National Research Centre on Camel, Bikaner (India)Bhatnagar, C S; National Research Centre on Camel, Bikaner (India). Camel dairying: An Indian perspective. *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.454–456 KEYWORDS: CAMELS. MILK PRODUCTION. STORAGE.

An investigation in Rajasthan and adjoining Madhya Pradesh was carried out to assess the present status of production and sale of camel milk in India. The statistics revealed that about 21562 females are in milk at a

time, producing about 23 080 thousand litre/annum. The camel milk is providing livelihood to about 3 218 families with average annual income of about Rs 60 000 and sustaining 56 360 camels in its natural habitat. If the above model is adopted, it is expected that at any time about 166 830 females will be in-milk producing about 201 thousand tonnes/year in Rajasthan. The milk collection is expected to increase by about 8-time its present level and the share of camel milk in the total milk produced in the state may reach to 2.5%. This may act as a main criterion for sustenance of camel breeds in the present era of diminishing draught utility.

0243. Pandey, Poonam; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, Anil; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Urea treatment effect on straw of different paddy cultivars grown in Tarai region of Uttarakhand. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1149–1152 keywords: digestibility. Rice. Straw. Urea. Varieties.

The present experiment was planned to study the response of urea treatment in different paddy straw cultivars. In study, samples of 18 cultivars were collected and half of the sample was treated with 4. urea (35. moisture) and kept for 4 weeks in air-tight polythene bags. Chemical composition and degradability of these paddy straw cultivars for DM, NDF, ADF, CP, HC and cellulose content were determined by using nylon bag technique. Three rumen fistulated animals were used to incubate nylon bags for 72 h. These animals were fed with green oat ad lib. just after feeding of concentrate mixture prepared from 30 parts of GNC, 32 parts of deoiled rice bran, 35 parts of wheat grain, 2 parts of mineral mixture and 1 part of common salt. After urea treatment, the mean CP content increased significantly while DM, NDF, ADF, HC and cellulose content decreased significantly. Significant urea treatment effect was seen as enhanced degradability of all parameters. Some low nutritive value paddy straw cultivars responded more due to urea treatment in comparison to the paddy straw cultivars of higher nutritive value.

0244. Krishnan, G; National Research Centre on Yak (ICAR), Dirang (India)Ramesha, K P; National Research Centre on Yak (ICAR), Dirang (India)Sarkar, M; National Research Centre on Yak (ICAR), Dirang (India)Chakravarty, P.; National Research Centre on Yak (ICAR), Dirang (India)Katakataware, M A; National Research Centre on Yak (ICAR), Dirang (India)Saravanan, B C; National Research Centre on Yak (ICAR), Dirang (India). Modified temperature humidity index for yaks. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.788–790 keywords: heat stress. Temperature. Humidity. Yaks.

The present experiment was carried out on healthy yaks maintained under semi range system of management belonging to different age groups and body weights at the NRC on Yak, Arunachal Pradesh, India. The physiological responses were recorded in morning and evening at fortnightly interval along with ambient temperature and relative humidity round the year. The temperature humidity index used for cattle was suitably modified for yaks. Yaks are comfortable at THI of 52. The heat load or heat stress was experienced by yaks when THI exceeds 52. The yaks were subjected to heat stress when the THI was above 52 as indicated by increased physiological responses.

0245. Dev, Inder; Regional Research Centre Indian Grassland and Fodder Research Institute, CSKHPKV Campus, Palampur (India)Misri, Bimal; Regional Research Centre Indian Grassland and Fodder Research Institute, CSKHPKV Campus, Palampur (India)Radotra, Sudesh; Regional Research Centre Indian Grassland and Fodder Research Institute, CSKHPKV Campus, Palampur (India)Sindhu Sareen; Regional Research Centre Indian Grassland and Fodder Research Institute, CSKHPKV Campus, Palampur (India)Singh, Virendar; Regional Research Centre Indian Grassland and Fodder Research Institute, CSKHPKV Campus, Palampur (India)Pathania, M. S.; Regional Research Centre Indian Grassland and Fodder Research Institute, CSKHPKV Campus, Palampur (India). Livestock scenario and socio-economic profile of an alpine area in Western Himalaya. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.824–828 Keywords: mountain climate. Grazing lands. Livestock. Pastures. Grazing.

The study was undertaken to understand the socio-economic profile and livestock rearing activities, forage resources and problems related to livestock rearing activities in Khanzar, Shukta and Chhaling villages of Udaipur block in Lahaul and Spiti district of Himachal Pradesh through participatory rural appraisal (PRA) and key informant interviews. There has been a sharp increase (40.62%) in population in the state from 1981 census to 2001 census; however, there is a slight decline in population of Lahaul and Spiti. Among livestock kept by the farmers, sheep ranked highest (74.62%) followed by cattle (12.07%), other animals (7.42%) and goats (5.89%). Average number of sheep and goats per household were 12.17 and 2.17, respectively, while cattle and horses were 2.62 and 0.13 per household. Semi-migratory system of livestock rearing is prevalent in the area. Leaves of seabuckthorn are fed to animals from Sep to Nov. Twigs of willow and *Betula* sp. trees are fed to the animals from Mar to April, during alternate years only. Stall feeding is done from Oct to May and hay made from the weeds, grasses and tree leaves of willow, *Betula* sp. and seabuckthorn leaves are fed to the animals. Women folk have to spend most of the time in tending the animals, fodder collection, grazing of animals and the distance travelled for fodder collection and distance travelled for animal grazing is much higher as compared to men in all the 3 villages. An individual woman spends about 1.95, 2.08, and 1.97 h/day as compared to 0.19, 0.06 and 0.14 h/day for fodder collection by men in Chhaling, Shukto and Khanzar villages, respectively. *Festuca gigantea* dominated the pastureland of the area at higher altitude, while *Sibbaldia*, *Phleum*, *Artemisia* and *Potentilla* were the other edible species observed. About 27, 24 and 20% of the farmers indicated that poor herbage production, poor grassland management and overgrazing of the pastures are most significant problems in livestock rearing activities. Poor fodder availability, lack of communication, education and medical facilities were some of the main problems revealed by the farmers and farmwomen through focused group discussions.

0246. Gandhi, R S; National Dairy Research Institute, Karnal (India) Singh, Surendra; National Dairy Research Institute, Karnal (India) Sachdeva, G K; National Dairy Research Institute, Karnal (India). Evolving correction factors for economic traits using time series analysis in Murrah buffaloes. *Indian Journal of Animal Sciences* (India). (Sep 2009) v.79(9) p.897–900 Keywords: Water buffaloes. Economics. Periodicity. Lactation. Statistical methods.

Lactation records (5247) of 1200 Murrah buffaloes spread over 37 years (1970 – 2006) were analyzed for evolving correction factors to adjust the data for non-genetic factors by time series analysis. The traits considered were age at first calving (AFC), lactation total milk yield (LTM_Y), lactation 305-day or less yield (L305DM_Y), lactation length (LL), calving interval (CI) and service period (SP). The overall least squares population means for these traits were 1349.39±6.33 days, 1841.90±32.62 kg, 1775.79±31.93 kg, 273.54±2.64 days, 428.30±3.54 days and 112.25±2.87 days, respectively. The seasonal and cyclical components of these traits were isolated. A periodicity of 7, 7, 7, 7, 6 and 6 years was observed in the above traits. The periodic function was fitted and it explained maximum variation in the above traits ranging from 34.18 (LTM_Y) to 99.01% (LL) revealing the periodicity of data over the years for majority of traits in Murrah buffaloes. Hence, the animal breeding data has to be adjusted for cyclicity over the years. Further, the monthly/seasonal indices estimated by ratio to trend method accounted for more environmental fluctuations and were more appropriate for decomposing the time series data than link relative method.

0247. Haunshi, Santosh; ICAR Research Complex for North Eastern Hills Region, Meghalaya (India) Doley, Sunil; ICAR Research Complex for North Eastern Hills Region, Meghalaya (India) Shakuntala; ICAR Research Complex for North Eastern Hills Region, Meghalaya (India). Production performance of indigenous chicken of northeastern region and improved varieties developed for backyard farming. *Indian Journal of Animal Sciences* (India). (Sep 2009) v.79(9) p.901–905 Keywords: Chickens. Production increase. Economic value. Farming systems.

The present study was conducted to evaluate the production performance of indigenous Miri type and improved varieties like Gramapriya and Vanaraja maintained at the Institute farm. All three genetic groups were evaluated for weekly body weight from 0 day to 8 weeks of age, biweekly body weight from 8 to 14

weeks of age and at 20 and 40 weeks of age; feed intake and feed conversion ratio (FCR.) up to 8 weeks of age; age at sexual maturity; egg production rate, shank and keel length and egg quality traits at 40 weeks of age. There were significant differences among all 3 genetic groups for body weights, keel and shank length, sexual maturity, egg production rate, egg weight, egg quality traits such as shell thickness, specific gravity and albumen index. Miri type had significantly early sexual maturity, better shell thickness, higher specific gravity and egg production rate (40 weeks), lesser feed intake and better FCR than the improved varieties. On the other hand improved varieties had significantly higher body weight at different ages, shank and keel length, egg weight (at sexual maturity and 40 weeks of age), and better egg production rate during 40 to 52 weeks of age. Among improved varieties, Vanaraja had significantly higher body weight, shank and keel length, higher feed intake and better FCR than the Gramapriya variety while Gramapriya had better egg production rate, early sexual maturity and higher egg mass. There were no significant differences between Vanaraja and Gramapriya for body weight at day-old and egg weight (at sexual maturity and 40 weeks of age). The study concluded that indigenous chicken could perform better than improved varieties for certain economic traits under same management and rearing conditions.

0248. Singh, S P; Project Directorate for Cropping System Research, Modipuram, Meerut (India) Gill, M S; Project Directorate for Cropping System Research, Modipuram, Meerut (India) Gangwar, B; Project Directorate for Cropping System Research, Modipuram, Meerut (India) Singh, M P; Project Directorate for Cropping System Research, Modipuram, Meerut (India). Livestock in irrigated farming systems of Uttar Pradesh. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.925–931 Keywords: economic value. Employment. Elasticity. Farming systems.

The study was taken up to work out an economic potential of livestock in irrigated farming systems of western Uttar Pradesh. The study based on 197 farmers of different size groups i.e. 63 marginal (1 ha), 66 small (1 to 2), 44 medium (2 to 4 ha) and 25 large (4 ha) randomly selected from 4 blocks of Bagpat and Ghaziabad district of Uttar Pradesh. On the whole the farmers in comparison to 1.82 buffalo out of 4.35 total animals kept, these were 0.58 crossbred cows clearly showed that crossbred breeding programme needs a special attention in the area. Most of the credit was disbursed toward crop cultivation. The employment from livestock activities was inversely related to farm size. Livestock constitutes about 39% of total income of marginal farmers while its share was only about 8% for large farmers. It indicated that the dairy business has wide scope on all farm size categories. Elasticity of coefficients in general varied from 0.096 for fertilizer consumption to 0.282 for area under other crops i.e. cereals, pulses, oilseeds and fodder etc. Elasticity coefficients for dairy animals were significantly positive for all size of farms indicating very good scope of livestock for increasing farm income. Fragmentation and subdivision of land holding, scarcities of labour, low yield of local seeds, less reliable market in context of changing global market, scarcity of owned fund exogenous factors like, dependence of natural resources, global warming, non availability of good quality seeds (variety and breeds) and shades for animals, poultry etc. were major constraints in following integrated farming system. Farmers were agreeing that integrated farming system maintain suitable production system without damaging resource base/environment. It provides family employment throughout the year. It enables recycling the waste with in farming system and provides balance food ultimately a good approach for improving standards of living by increasing resource use efficiency and income generation round the year. Farmers may be encouraged for commercializing dairy activity by providing credit, marketing and high productive dairy animals.

0249. Singh, K P; SD Agricultural University, Sardarkrushinagar (India) Dixit, S P; SD Agricultural University, Sardarkrushinagar (India) Singh, P K; SD Agricultural University, Sardarkrushinagar (India) Tajane, K R; SD Agricultural University, Sardarkrushinagar (India) Singh, Gurmej; SD Agricultural University, Sardarkrushinagar (India) Ahlawat, S P S; SD Agricultural University, Sardarkrushinagar (India). Economics of goat farming under traditional low input production system in north Gujarat region of India. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.948–951 Keywords: Economics. Goats. Farming systems. Traditional technology.

The economics of goat farming was worked out in terms of returns over the total cost incurred under the traditional low input production system as prevalent in Mehsana, Banaskantha and Patan districts of Gujarat state of India. The data was collected from 162 goat keepers' flocks. The average annual recurring expenditure and net profit per lactating doe was Rs 524.64 and Rs 668.81, respectively. The maximum net receipt of Rs 814.38/lactating goat was observed in very large sized flock (70). Overall annual net profit per household in the survey area was observed Rs 18,162.46, which varied from Rs 3,179.87 to Rs 51,381.59 depending on the size of the flock. The goat farming under traditional extensive low input production system is a profitable entrepreneurship and a livelihood security particularly for landless, small and marginal farmers, and rural poor. The profitability can further be improved by increasing the size of the flock with approximately the same utilization of labour as with small sized flock.

0250. Patil, B R; BAIF Development Research Foundation. Pune (India) Pradhan, P K; BAIF Development Research Foundation. Pune (India) Ranganekar, D V; BAIF Development Research Foundation. Pune (India) Udo, H M J; BAIF Development Research Foundation. Pune (India). Livestock contribution to farm income of tribal and non-tribal farmers in Gujarat, India. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1269-1272 Keywords: Farm income. Livestock. Ethnic groups. Farmers.

This study quantified some of the economic components of mixed farms in Gujarat, to understand the prospects for livestock development in tribal and non-tribal areas. In tribal farmers' farm, on an average, only 60% of the crop land of non-tribal farmers and their household income is about 50% less than that of non-tribal farmers. Livestock contributed relatively more to household income in tribal areas than in non-tribal areas (32% vs 20% respectively). Number of livestock, milk offtake per average cow and cash inputs into cropping related positively to livestock gross margins. Continued population pressure will entail continued decrease in farm sizes. As land area decreased the relative importance of cattle increased in both tribal and non-tribal areas. Tribal farmers have less resources for crop production, therefore livestock is considered to be an important development option for them. However, tribal farmers are not in an economic position to use cash inputs for livestock activities.

0251. Solanki, C P S; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Madhya Pradesh (India) Nanavati, S; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Madhya Pradesh (India) Nayak, N K; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Madhya Pradesh (India) Bhadoria, H B S; Jawaharlal Nehru Krishi Vishwa Vidyalaya, Madhya Pradesh (India). Carcass traits of local goats under different managemental systems. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1277-1279 Keywords: Carcasses. Goats.

The effect of managemental systems on carcass characteristics of goats was studied. Sixteen male kids of local goats with similar weight and age were divided into 2 equal groups. First group (semi-intensive) was supplemented with concentrate feed, whereas the second group (extensive) was kept unsupplemented. Both the groups were maintained on grazing or browsing for 8 h daily. The results indicated that the carcass characteristics of experimental animals significantly ($P < 0.01$) differ between 2 systems. Preslaughter weight, slaughter weight, carcass weight, dressing percentage (PSW and ELW basis) and the weights of liver, hide and head were significantly higher in semi-intensive system than extensive system, whereas significant difference was not found between weight of heart and kidney. Economics of goat rearing showed that cost per kg weight gain and net return were observed higher in semi-intensive system than extensive one. Thus the semi-intensive system is superior and beneficial over extensive system of rearing goats and may be preferred for goat rearing.

0252. Gandhi, R S; National Dairy Research Institute, Karnal (India) T V Raja; National Dairy Research Institute, Karnal (India) Ruhil, A P; National Dairy Research Institute, Karnal (India) Kumar, Amit; National Dairy Research Institute, Karnal (India). Prediction of lifetime milk production using artificial neural network in Sahiwal cattle. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1038-1040 Keywords: Neural networks. Milk yield. Statistical methods. Cattle.

0253. Naik, P K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)S Saijpaul; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Sirohi, A S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)M Raquib; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Lactation response of cross bred dairy cows fed on indigenously prepared rumen protected fat-A field trial. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1045–1049
Keywords: crossbreds. Cows. Lactation. Rumen.

A field trial was conducted to study the effect of supplementation of an indigenously prepared rumen protected fat (PF) on lactation response in crossbred dairy cows. High yielding multiparous (2nd to 3rd lactation) crossbred cows (15) were randomly divided into 3 groups of 5 animals in each, based on parity, date of parturition and previous lactation milk yield. During early lactation i.e. up to 90 days of post partum period, the animals were offered 6.5 kg CM1, 25 kg green berseem and 2 kg wheat straw (WS) daily. During the mid lactation i.e. from 90 to 150 days post partum period, the feeding schedule was 6.5 kg CM2, 35 kg green maize and 1 kg WS daily. Besides, the animals in 3 groups were randomly supplemented without (control) or with 200 g RBO (RBO200) or 200 g PF (PF200) on fat equivalent basis. The CP and EE contents of the total ration during early (TMR1) and mid (TMR2) lactation were 16.2 and 3.5% and 14.1 and 3.5%, respectively. In the treatment groups, due to the supplemental fat, the EE content of the TMR1 and TMR2 was 5.2% and 5.0%, respectively. There was consistently higher milk yield (MY) and 4% fat corrected milk yield (FCMY) in the PF200 group over the control and RBO200 group throughout the lactation period. During early lactation, the MY increased 3.2 kg/day (19.6%) and the FCMY increased 2.8 kg/day (22.3%) in the PF200 group over the control group. However, the RBO200 group had no beneficial effect on MY and FCMY over the control group. The milk composition (fat, SNF, protein and lactose) remained similar among the groups, but the total yield of milk fat, SNF and protein was higher in PF200 group over the control. The milk urea nitrogen (MUN)% was similar among the groups and was within the normal range. During mid lactation, although the MY and FCMY in PF200 group were higher than the control group, it could not pass the statistical test and the RBO200 group had no effect on the MY and FCMY. Besides, both RBO200 and PF200 groups had no effect on the milk composition. The MUN% was also similar among the groups and was within the normal range. In early lactation, the initial, final and changes in body weight (BW) and body condition score (BCS) were similar ($P < 0.05$) among the groups. There was initial fall in both BW and BCS in all the groups followed by gradual recovery after the peak yield, however, the recovery of the BW and BCS in RBO200 and PF200 groups was better than the control group. Also, in the mid lactation, the initial, final and changes in BW and BCS were comparable ($P < 0.05$) among the groups. The number of artificial inseminations required per conception in PF200 group (1.2) was lower than the RBO200 group (1.4), indicating better reproductive performance. Due to supplementation of the PF, there was net profit of Rs 34.50/cow/day over the control group during early lactation. It was concluded that the daily supplementation of 200 g PF (Ca-LCFA) increased MY (3.2 kg/day; 19.6%) and FCMY (2.8 kg/d; 22.3%) with improved reproductive performance and BCS in cross bred cows over the control group during early lactation, however, the supplementation had no significant beneficial effect in mid lactation.

0254. N Akila; Indian Veterinary Research Institute, Izatnagar India)Mahesh Chander; Indian Veterinary Research Institute, Izatnagar India). Utilization pattern of draught bullocks by different categories of farmers in Tamil Nadu. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1061–1065
Keywords: bullocks. Ploughing. Small farms. Tamil nadu.

The extent of dependence of farmers on bullocks, for farming and other activities was assessed in the 7 agro-climatic zones of Tamil Nadu by selecting 1 district from each zone, with the sample of 210 (70 small, 70 medium and 70 large) farmers. The results indicated that 91.43% large farmers and 40% of the medium farmers maintained the animals mainly for their own use. Whereas, the small farmers utilized their bullocks for ploughing in others field (28.57%), commercial carting (25.71%) and for both the activities (45.71%), while 35.71% of medium farmers were using their bullocks for commercial carting apart from their own use. The

overall average number of days of utilization in agriculture was 36.28 days. The average working days for small farmers were 220.54 days, 156.16 days for medium farmers and 46.61 days for large farmers. The study indicates that still draught bullocks are a main source of farm power for small farmers, to certain extent for medium farmers and for certain operation with large farmers.

0255. Samantray, K C; Orissa University of Agriculture and Technology, Bhubaneswar, (India)Rao, P K; Orissa University of Agriculture and Technology, Bhubaneswar, (India)Panda, P; Orissa University of Agriculture and Technology, Bhubaneswar, (India)Dash, S K; Orissa University of Agriculture and Technology, Bhubaneswar, (India). Ghumusar cattle—an indigenous germplasm of Ghumusar tehsil in Ganjam district of Orissa. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1069–1070 Keywords: cattle. Germplasm. Orissa.

0256. Singh, K; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India)Brar, P S; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India)Gandotra, V K; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India). Status and cost of raising replacement dairy heifers in rural, rural commercial and pen-urban areas of Punjab. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.692-695 KEYWORDS: heifers. Management. Rural areas.

The present study was conducted to investigate the current status of heifers at rural, rural commercial and pen-urban commercial dairy farms. The average number of buffalo and cow heifers per dairy farm was significantly more in periurban and rural commercial than in rural farms. The average age at puberty in buffaloes (3.0 ± 0.2 years) and cows (1.9 ± 0.3 years) was significantly less in rural commercial farms as compared to their rural (4.1 ± 0.3 and 2.8 ± 0.2 years) and pen-urban counterparts (3.6 ± 0.2 and 2.4 ± 0.2 years, respectively). The net costs of pre-weaned, weaned to prepubertal, pubertal and first calvers was significantly higher in rural commercial than rural and pen-urban farms. However, average cost (Rupees) to rear a heifer until first calving was significantly more in pen-urban than in rural and rural commercial farms. Most farmers (84.8% rural commercial, 81.3% pen-urban commercial and 61.3% rural) were interested in keeping the animals solely for milk production. About 89.1% rural commercial, 61.3% rural and 35.9% pen-urban farmers sold their livestock to other farmers because of low milk yield, high rearing cost, productive and reproductive problems. In comparison, disposal of animals for slaughter by rural commercial, rural and pen-urban commercial farmers was 10.9%, 38.7% and 64.1%, respectively. Few people still preferred in keeping old and infertile animals (11.3% rural, 8.7% rural commercial and 17.2% pen-urban commercial) due to sentimental approach. It can thus be summarized that heifer raising is practiced in all the three types of farms, although, cost of rearing is higher in the periurban ones.

0257. Bhakat, Champak; National Research Centre on Camel, Bikaner (India)Pathak, K M L; National Research Centre on Camel, Bikaner (India). Socio-economic aspects of dromedary camel management in hot arid desert ecosystem. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.700-705 Keywords: Camels. Farmers. Management. Production. Arid zones. Rearing techniques.

0258. Buragohain, R.; Central Agricultural University, Mizoram (India)Kalita, G.; Central Agricultural University, Mizoram (India)Sarma, K.; Central Agricultural University, Mizoram (India)Hazarika, P.; Central Agricultural University, Mizoram (India). Effects of managemental system on performance and economy of growing Japanese quails. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1180–1182 Keywords: Carcass composition. Economics. Growth. Management.

Growth, carcass characteristics and economics of Japanese quails (*Coturnix coturnix japonica*) were studied under cage and deep litter system of management using 80 Japanese quail chicks (2-week-old, either sex). They were divided into 2 groups (cage and deep litter) with 2 replicates. Body weight gain (g/week) was higher in female quails irrespective of management system, but cage rearing resulted significantly higher body weight gain in both sexes than DLS. Feed consumption (g/bird/day) was comparable for both the managemental practices. Percentage carcass yields were significantly higher for thigh, back and neck under CSM for both

sexes. Significantly higher yields of drumstick and wing in males under cage, and breast and wing in females under DLS was observed. Yield of giblet was proportionately higher in female. Dressing percentage was significantly better for both sexes on cage than the DLS. Significantly lower cost involved in feeding for producing 1 kg live weight gain under cage rearing with better feed conversion ratio (FCR). It may be opined that the best marketing age of the quails for meat purpose is at sixth weeks of age and cage system may be superior to deep litter rearing for optimum growth, carcass yields and economy.

0259. Sethi, A.P.S.; Sikka, S.S. (Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) College of Veterinary Science, Department of Animal Nutrition). Effect of Varying Levels of Available Phosphorus on Performance of Broiler Chicks in Hot Humid Climate. *Animal Nutrition and Feed Technology (India)*(Jan2009) v.9(1) p 51-56. Keywords: Broiler chickens, Phosphorus, Climate

An experiment was conducted in hot and humid climate on one-week-old broilers to study the effect of varying levels of available phosphorus on the growth performance. Eighty broiler chicks of one-week age were divided into eight groups of 10 chicks (5 males and 5 females) in each. Four experimental diets with varying available phosphorus levels of 0.40, 0.50, 0.60 and 0.65 percent at one percent calcium level were formulated. Each diet was fed to a duplicate group of chicks up to sixth week of age. Results revealed that the highest body weight was at 0.5 percent available phosphorus level beyond which it declined. But the body weights at 0.6 and 0.65 percent available phosphorus were more than that at 0.4 percent available phosphorus levels. Weight gain at 0.4 percent available phosphorus level was significantly ($P<0.05$) less than at higher levels studied. Dietary increase in the phosphorus level significantly ($P<0.05$) affected the feed consumption of the birds. Significantly ($P<0.05$) more feed consumption was recorded at 0.60 and 0.65 percent phosphorus levels as compared to the lowest level of (0.4 percent) available phosphorus. Minimum feed intake per unit gain was recorded at 0.5 percent available phosphorus level. Dressing percentage, meat: bone ratio, shank length and shank width was significantly ($P<0.05$) affected by the dietary treatments. Males put up more weight in bones than females and also had significantly higher shank weight, length and shank width. From the data it was concluded that the broiler diets during hot humid climatic conditions should contain 0.5 percent available phosphorus.

0260. Sawaimul, A.D.; Sahare, M.G.; Ali, S.Z.; Kolte, B.R. (Nagpur Veterinary College, Nagpur (India) Department of Animal Genetic and Breeding). Survivability of Osmanabadi goat maintained at Farm condition in Vidarbha Climatic Condition. *Veterinary World (India)* (Feb 2009) V.2(2) p. 57. Keywords: Survivability, Osmanbadi Goats, Farm, Climate.

Present investigation was carried out to study the survivability in Osmanbadi Goat maintained under farm condition. Result reveals the overall survivability rate of Osmanbadi goat was 68.87 %, whereas in adult and kids it was found to be 81.60 % and 47.16 % respectively. The chi square value was statically significant for effect of age on survivability.

261. Hadiya, K. (College of Veterinary and Animal Sciences, Anand (India) Dept. of Livestock Production Management); Maini, S.; Rekhe, D.S.; Ravikanth, K (Ayurved Limited, Baddi (India)). Accelerated Growth Programme with Polyherbal Formulations for Dairy Calves. *Veterinary World (India)* (Feb 2009) v.2(2) p. 62-64 Keywords: Calves, growth, digestibility, body weight

An experimental field study in approximately one month old, forty eight Jaffrabadi buffalo calves was carried out to evaluate efficacy of herbal formulations on growth & average daily gain. Calves were randomly divided into four groups, one control & three treatments. Treated groups were administered herbal formulations; Ruchamax, AV/DAC/16 @5gm/calf/day & Yakrifit @1 bolus/ calf/day following treatment regimen of once a week per month for three consecutive months therapy. Growth related parameters were recorded for ninety days of experimental trial. It was observed that supplementation of herbal growth promoter & liver tonic products significantly improved liver function, feed assimilation & digestibility of ration ultimately leading to gain in body weight as compared to untreated control group.

L02 Animal Feeding

262. Blummel, M.; Rao, S.S. (National Research Center for Sorghum, Hyderabad (India) Palaniswami, S. (Rusni Distilleries, Hyderabad (India), Shah, L. (Miracle Fodder and Feeds Pvt. Ltd., Shamshabad (India)). Reddy, Belum V.S. (International Livestock Research Institute, Patancheru (India)). Evaluation of Sweet Sorghum (*Sorghum bicolor* L. Moench) Used for Bio-ethanol Production in the Context of Optimizing Whole Plant Utilization. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v.9 (1) p 1-10 Keywords: Sweet sorghum, Bio-ethanol, Digestibility in vitro

Eighteen hybrids and 16 varieties of sweet sorghum were investigated for yields of grain, stover, juice extract for bio-ethanol distillation and bagasse and the relationships between these productive traits. There was a large degree of independency between grain and stover yields, suggesting that sweets sorghum can provide both grain and fodder yield. Juice extract yields from the stems were not significantly related to grain yields. The differences in stover fodder quality traits were significant: nitrogen content ranged from 0.44 to 0.72% in hybrids and from 0.50 to 0.89% in varieties while in vitro digestibility ranged from 43.8 to 54.5% in hybrids and from 48.8 to 54.8% in varieties. Differences in in vitro digestibility of bagasse plus stripped leaves were also substantial, ranging from 39.3 to 49.1% in hybrids and from 42.0 to 50.4% in varieties. The palatability of bagasse and stripped leaves to cattle was investigated by incorporation of the distillery residues of one sweet sorghum variety into a commercial feed block, replacing the traditionally used (non sweet) sorghum stover. There was no statistical difference in intake (DMI) and live weight gain (LWG) between bulls fed the bagasse plus stripped leaf based blocks (DMI of 3.7% of live weight and 0.73 kg/d of LWG) and bulls fed the original sorghum stover based commercial feed block (DMI of 3.5% of live weight and 0.82 kg/d of LWG). We conclude that sweet sorghum can provide food (grain), fodder (bagasse/leaf residues) and bio-ethanol at the same time.

263. Mondal, S.; Samanta, C.C.; Bairagi, B.; Biswas, P. (West Bengal University of Animal and Fishery Sciences, Kolkata (India) Department of Animal Nutrition) Effects of Organic and Inorganic Forms of Supplemental Copper, Zinc, Iron and Manganese at Different Dose Levels on Growth Performance and Plasma Minerals in Crossbred Male Calves. Keywords: Calves, Growth, Inorganic, Trace mineral, Proteinate, Plasma.

The present experiment was carried out to assess the effect of organic and inorganic forms of trace minerals at different supplementary levels on the growth performance of crossbred male calves. Twenty cross-bred male calves (6–9 months), were randomly distributed into 5 groups viz. C (Control), T1, T2, T3, T4 consisting of four calves each. Inorganic trace minerals (Cu, Zn, Fe and Mn) were fed at 200% of the NRC requirements in T1 group and proteinate trace minerals (Cu, Zn, Fe and Mn) were supplemented at 100%, 50% and 25% of the NRC (2001) requirements in T2, T3 and T4 respectively. In Control (C) group the said trace mineral requirements were met through addition of inorganic salt of those elements. Effect of proteinate and inorganic trace minerals supplementation was assessed by body weight gain, average daily gain, plasma major (Ca, P and Mg) and trace (Cu, Zn, Mn and Fe) mineral profiles. Result revealed that supplementation of proteinate trace minerals at NRC dose level to male calves improved body weight gain and average daily gain as compared to the calves supplemented inorganic minerals at NRC (2001) dose level. Supplementation of proteinate trace mineral at NRC dose level to male calves did not alter plasma major mineral (Ca, P and Mg) profile but increased plasma Cu, Zn, Mn and Fe after 90 days of feeding trial. It was concluded that supplementation of proteinate trace elements (Cu, Zn, Fe and Mn) at NRC requirement in crossbred male calves may improve the body weight gain than that of inorganic trace minerals.

264. Saraf, R.S.; Baghel, R.P.S.; Manwar, S.J. (College of Veterinary Science and Animal Husbandry, Jabalpur (India) Department of Animal Nutrition). Effect of Coarse Cereals Replacing Maize on Performance, Cost of Feeding and Carcass Characteristics of Broiler Chickens. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v.9 (1) p 57-64. Keywords: Broiler chickens, Carcasses, Coarse grains, Sorghum.

The present investigations have been undertaken to study the effects of feeding coarse cereals on growth performance, carcass quality traits and cost of feeding in broilers. A total of 168 chicks were randomly distributed into 21 replicates of 8 chicks each; three replicates were allotted to each of the seven dietary treatments. Treatment one was control diet containing maize as sole source of cereal, while rest of the diets were formulated replacing maize in the control diet by sorghum (at 50, 75 and 100% levels) or kodomillet (*Paspalum scrobiculatum*) (at 25, 50 and 75% levels). Feed consumption of broilers fed maize or sorghum diets were similar ($P>0.05$). Broilers fed 25% kodomillet consumed maximum ($P<0.05$) quantity of feed but with increasing level of kodomillet drastic reduction in the feed intake was noticed. The BW gain as well as performance index (PI) of broiler fed control diet was significantly ($P<0.05$) higher than all other groups. Incorporation of sorghum or kodomillet caused significant reduction in these attributes. This was reflected in feed cost per kg BW gain as well which was minimum in groups assigned maize based control diet. However, the feed cost per unit BW gain was increased ($P<0.05$) in kodomillet based diets compared to either control or sorghum based diets. Dietary treatments had significant influence on the overall carcass characteristics and showed variable response in different parameters in response to dietary treatments. Use of higher level of sorghum had reducing effect on the organ weights of broilers. Use of kodomillet was responsible for higher processing losses. It may be concluded that sorghum can be used economically in broiler diet to the extent of 75% replacing maize while kodo can substitute maize beneficially to the tune of only 25%. However, these coarse cereals can be economical only if they are cheaper to that of maize.

265. Kumar, S.; Sinha, A.P.; Singh, R.N.; Singh, S.K.; Thakur, S. (Birsa Agricultural University, Ranchi (India) College of Veterinary Science and Animal Husbandry. Animal Nutrition Department) Effect of Kitchen Waste on Growth of Crossbred (Tamworth × Desi) Pigs. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v.9 (1) p 81-84. Keywords; Crossbreds, pigs, food wastes, Growth, Feed conversion efficiency

The study was conducted on 36 weaned crossbred (Tamworth × Desi) pigs (2.5 months, 11.00 ± 0.54 kg) divided into three equal groups and maintained on isocaloric and iso-nitrogenous grower ration. The control group (T1) ration was totally replaced with raw kitchen waste and boiled kitchen waste in groups T2 and T3, respectively. Feeding trial continued for 126 days. Pigs on raw kitchen waste (T2) and boiled kitchen waste (T3) had significantly ($P<0.05$) higher daily weight gain (340 ± 11.3 and 316 ± 12.0 g) than group T1 (265 ± 9.9 g). The feed conversion efficiency (kg feed/kg gain in BW) was also significantly ($P<0.05$) better in T2 (3.42 ± 0.08) and T3 (3.62 ± 0.12) than the control group (4.10 ± 0.20). Cost of feed per kg gain in body weight was lowest in T2 (Rs. 20.53) followed by T3 (21.70) and higher in group T1 (Rs. 42.46). The percent reduction in cost against the control diet was 51.65% in T2 and 48.87% in T3. It was concluded that feeding of kitchen waste as raw or boiled replacing concentrate mixture totally increased the productive performance of pigs.

266. Singh, S.K.; Niranjana, P.S.; Singh, U.B.; Koley, S.; Verma, D.N. (Narendra Deva University of Agriculture and Technology, Faizabad (India). Department of Animal Nutrition). Effects of Dietary Supplementation of Probiotics on Broiler Chicken. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v.9 (1) p 85-90. Keywords; Probiotics, Broiler chickens, Growth, Performance

A study was conducted to observe the effects of dietary supplementation of probiotics on broiler chicken. Day old chicks ($n=240$) were randomly distributed in one of four dietary treatments, viz. C (Control, basal diet only), T1 (probiotic at 0.02% of diet), T2 (probiotic at 0.025%) and T3 (probiotic at 0.03%). The probiotic supplement was used in the form of Lacto-Sacc (Alltech, Bangalore) that contained live yeast culture (Yea Sacc1026 4.49×10^9 , *Lactobacillus acidophilus* 108 and *Streptococcus faecium* 108 per gram). Results obtained from the six week study revealed that supplementation of probiotics at varying levels to the broiler chicken yielded positive effects on growth performance (3.28–4.03 per cent higher body weight than control) in broilers such as increased body weight gain, feed efficiency, protein efficiency and performance index and the best effect was observed for the supplementation at 0.025% level. However, there was no significant effect on haematobiochemical parameters assessed at six weeks of age except serum cholesterol level (mg/dl) which was significantly ($P<0.05$) lower in probiotic supplemented groups T3 (156.94 ± 0.42), T2 (157.56 ± 0.61), T1

(158.15±0.51) than control (174.78±0.57) group. It is concluded that probiotic supplementation at different level in poultry diet has beneficial effect on growth performance.

267. Yadava, P.K.; Niranjana, P.S.; Udeybir, Koley S.; Verma, D.N. (Narendra Deva University of Agriculture and Technology, Faizabad (India). Department of Animal Nutrition). Performance of Broiler Chicken as Affected by Varying Levels of Multi Enzyme Supplementation. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v.9 (1) p 103-108. Keywords; Broiler chicken, Growth, Performance, Enzymes

A study was carried out to observe the effects of dietary supplementation of enzymes on the commercial broiler chicken. Day old chicks (n=240) were randomly distributed in 12 groups with three replicates. Four dietary treatments with varying levels of Allzyme-SSF® supplementation viz. C (Control, basal diet only), T1 (enzymes 0.015%), T2 (enzymes 0.020%) and T3 (enzymes 0.025%) were formulated and fed triplicate group of birds. The basal diet was formulated for starter (0–4 weeks) and finisher phase (4–6 weeks) separately following BIS (1992) requirements. Body weight gain (g) of the birds was significantly higher in treatment groups than control (981.89±6.34) at 0–4 weeks period and feed intake (g) in T1 (478.50±7.21) and T2 (473.67±2.52) than T3 (456.00±2.17) at 0–2 weeks of age. Feed efficiency was 2.05±0.01, 1.92.0±0.01, 1.93±0.01, 1.93±0.01 for control, T1, T2 and T3, respectively. Protein efficiency was significantly higher in enzyme treated groups as compared to control. Blood samples collected from 10 birds from each replicate during slaughtering at 42 days revealed no influence of enzymes on haemato-biochemical parameters. It is concluded that the supplementation of enzymes at varying levels to the diets of broiler chicken yielded positive effects on the birds performances with cost effective production and had no significant effect on haematobiochemical parameters of commercial broiler chicken of mixed strain.

0268. Nakajothi, N; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Nanjappan, K; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Selvaraj, P; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Jayachandran, S.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)P Visha; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Production performance and blood biochemical changes in broiler chickens fed amla during induced-stress conditions. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1124–1126 keywords: broiler chickens. Feeding. Stress.

An experiment was conducted in broiler chickens to evaluate the efficacy of *Emblica officinalis* (amla) fruits rich in vitamin C in alleviating stress induced by ACTH injection 3 IU / kg body weight for 5 d from 22 d of age. The birds were fed standard broiler diet supplemented with 5, 10 or 20 g amla dry powder or 250 mg synthetic vitamin C / kg diet. Body weight and feed efficiency were measured weekly. The plasma glucose, serum total cholesterol, high-density lipoprotein and triglycerides were measured at 21, 28 and 42 d of age. The results suggested that while the mean body weight was not influenced by amla supplementation, the feed efficiency was significantly improved by 10 g / kg amla feeding, compared to other groups. Serum triglycerides level decreased in amla-fed groups compared to control at third and fourth weeks of age. Other blood biochemical parameters like plasma glucose, serum total cholesterol and highdensity lipoprotein did not vary between treatments. It can be concluded that the broiler diet can be supplemented with amla at 10 g / kg as an anti-stress agent during stress periods of broiler production.

0269. Saikia, P.; Indian Veterinary Research Institute, Izatnagar (India)Chhabra, A. K.; Indian Veterinary Research Institute, Izatnagar (India)Bhar, R.; Indian Veterinary Research Institute, Izatnagar (India)Pragati, H; Indian Veterinary Research Institute, Izatnagar (India). Performance of crossbred pigs (Landrace × desi) fed on food waste. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.819–823 keywords: food wastes. Growth. Swine.

Crossbred (Landrace×desi) pigs (36) were randomly distributed into 3 dietary treatments (T1, T2 and T3 diets) each having 12 pigs of 6 castrated male and 6 females. The pigs were fed on ad lib. control diet in T1; limited control diet (25% dry matter intake (DMI) of T1) along with ad lib. food waste (FW) collected from students

hostel and air force mess in T2 and ad lib. FW in T3. A digestibility trial was conducted on 5 animals of each treatment. During the feeding trial, the CP% of food wastes ranged from 18.28 to 21.42 and CF% of food waste ranged from 2.14 to 6.11. Digestibility coefficient of CP was highest in T3, followed by T2 and T1. The difference of average daily gain (ADG) was significant among treatments, but comparable between T2 and T3. Feed (DM): gain was significantly lower in T3 followed by T2 and highest in T1. Digestible energy (DE) values (kcal/kg) of food waste based diets (T2 and T3) were significantly higher than the control diet (T1). But the DMI (g/d) was significantly lower in pigs fed on food waste based diets, which in turn increasing the feed conversion efficiency of pigs in T2 and T3. Carcass characteristics in terms of average back fat thickness (BFT), dressing percentage and loin eye area (LEA) were not affected by the dietary treatment. Likewise, differences of prime as well as minor cuts were insignificant. Duration of estrous cycles and age at puberty were also not affected due to feeding of FW. Thus, it can be concluded that nutritive value of food waste based diets was much higher than the concentrate mixture based diets, and this mixture could improve the feed: gain and carcass characteristics of pigs without any adverse effect.

0270. Sinha, R R K; Indian Veterinary Research Institute, Izatnagar (India)Dutt, Triveni; Indian Veterinary Research Institute, Izatnagar (India)Singh, R R; Indian Veterinary Research Institute, Izatnagar (India)Bhushan, Bharat; Indian Veterinary Research Institute, Izatnagar (India)Singh, Mukesh; Indian Veterinary Research Institute, Izatnagar (India)Kumar, Sanjay; Indian Veterinary Research Institute, Izatnagar (India). Feeding and housing management practices of dairy animals in Uttar Pradesh. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.829–833 Keywords: Dairy cows. Feeding. Housing. Management. Uttar pradesh.

A field survey was conducted to acquire the first hand information on bovine herd management in rural, semi-urban and urban areas of Bareilly Tahsil of Bareilly district. The information on feeding and housing management practices was collected using structured schedule from 90 households rearing cattle and buffalo each from rural, semi-urban and urban area. Wheat straw was used as dry fodder by 86 to 98% of farmers in rural, semi-urban and urban areas. In urban areas 97.8% farmers fed concentrate round the year but in rural and semi-urban areas, only 66.7 and 75.6% farmers followed this practice. None of the farmers used silage, hay making or urea treated straw. Results revealed that 63.3% of the rural farmers shared their residence with the animals; this percentage was higher in semi-urban areas (83.3%). Brick floor was observed in 85.6, 72.2 and 80% houses respectively in rural, semi-urban and urban areas. Size and height of the houses were optimum in more than 75, 65 and 90%, of the farmers in rural, semi-urban and urban areas.

0271. P Anilkumar; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India)Sathyanarayana, M L; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India)Vijayasarithi, S K; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India)Gowda, R N Sreenivas; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India)Rao, Suguna; Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Evaluation of ameliorating effect of vitamin E and selenium in experimental aflatoxicosis and ochratoxicosis in broiler chicken. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.844–846 Keywords: aflatoxins. Chickens. Ochratoxins. Selenium. Vitamin e.

Ameliorating effect of vitamin E and selenium in broiler chickens during individual and combined feeding of aflatoxin (AF) and ochratoxin (OA) was studied. Vitamin E and selenium fed birds showed less severe lesions compared to toxin fed birds. The results indicated synergistic effect of AF and OA on individual organ and the role of vitamin E and selenium in ameliorating the adverse effects of AF and OA in broilers.

0272. Santra, A.; Indian Veterinary Research Institute, Izatnagar (India)Pathak, N N; Indian Veterinary Research Institute, Izatnagar (India). Effect of restricted concentrate feeding on nutrient utilization and growth performance of crossbred calves maintained on wheat straw based diet. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.906–911 KEYWORDS: Body weight. Calves. Concentrates. Nutrition physiology. Wheat straw.

A feeding trial was carried out for 238 days to assess the effect of restricted dietary concentrate to wheat straw based diet on nutrient digestibility and body weight gain in crossbred calves. Crossbred calves were divided into 4 groups (G1, G2, G3 and G4) of 5 each. Calves of G1 and G2 were received 60 and 30. concentrate in their ration along with wheat straw, respectively, supplying equal amount of dietary protein to the both group throughout the experimental period. The calves in group G3 received 30. concentrate in their diet for 1–119 days of experiment and 60. concentrate during 120–238 days of experiment and vice versa in group G4. Nutrient digestibility was influenced by the dietary level of concentrate. Higher digestibility of DM, OM, CP, energy and lower digestibility of NDF, ADF and cellulose were observed in calves received high concentrate diet than those consumed low concentrate diet. Retention of nitrogen (as of intake and absorb nitrogen) was higher in low concentrate fed calves. ME and DM intake were affected by the level of dietary concentrate, being higher in high concentrate fed group. Calves were gained 564.7, 395.8, 511.8 and 489.9 g/day in G1, G2, G3 and G4 groups, respectively. The results suggested that a wheat straw based diet containing 30. concentrate supported 396 g average daily body weight gain which may be considered optimum for crossbred calves.

0273. Malik, P K; National Dairy Research Institute, Karnal (India) Singhal, K K; National Dairy Research Institute, Karnal (India) Deshpande, S B; National Dairy Research Institute, Karnal (India). Effect of saponin rich lucerne fodder supplementation on rumen fermentation, bacterial and protozoal population in buffalo bulls. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.912–916 Keywords: water buffaloes. Lucerne. Forage. Saponins. Rumen digestion. Rumen.

Saponin content of lucerne (*Medicago sativa*) fodder at second cut was observed highest (2% on DM basis). Lucerne fodder (II cut) at 30 % level was supplemented to the total mixed ration for investigating the effect on DM intake, rumen fermentation and microbial population in buffalo bulls. Male buffalo bulls (6) were randomly divided into 2 groups of 3 animals each in which group 1 was fed on wheat straw and concentrate (60:40) based TMR-1 while group 2 was fed on lucerne supplemented TMR-2. The intake of saponins through lucerne fodder in group 2 was 47.43 g/d, which did not affect DM intake adversely, and DM intake in group 2 was somewhat higher than recorded for group 1. The saponins of lucerne fodder (II cut, 30 % level in TMR) did not affect the rumen pH, ammonical nitrogen (mg/100 ml) and total volatile fatty acid production (m mol/l) however, acetate and propionate in the TVFA was affected significantly, while the proportion of butyrate remain unaffected by the supplementation. The numbers of bacteria including total, cellulolytic and methanogenic in group 2 was somewhat higher than in group 1 but the variation between both the groups was not significant and saponins through lucerne fodder up to the level of 47 g/d did not affect the bacterial biomass significantly. Protozoal population in the rumen was affected significantly by the saponins of lucerne fodder and about 20 % reduction in protozoal population was observed due to the supplementation of lucerne fodder. Thus, it may be concluded that saponins through lucerne fodder up to the level of 0.60% of DMI can reduce the protozoal population significantly without affecting other rumen biomass, DM intake and fermentability of feed and thereby can increase the production potential of ruminants. Therefore, more natural feeds having saponins should be explored along with safe level of their inclusion in the ration.

0274. Chaturvedi, O H; Central Sheep and Wool Research Institute, Avikanagar (India)Kumar, Sushil; Central Sheep and Wool Research Institute, Avikanagar (India)Mishra, A K; Central Sheep and Wool Research Institute, Avikanagar (India)Arora, A L; Central Sheep and Wool Research Institute, Avikanagar (India)Karim, S A; Central Sheep and Wool Research Institute, Avikanagar (India). Effect of complete feed or grazing and supplementation of lambs on performance, nutrient utilization and feed cost of production. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.917–920 Keywords: Grazing. Lambs. Nutrition physiology. Production possibilities. Supplements. Stalls.

A study was conducted, to compare 2 feeding systems, viz. stall feeding (SF) and grazing plus supplementation (GR) evaluating body weight gain, nutrient utilization and feed cost of production of Avikalin lambs. SF animals received ad lib. complete feed (CF), GR animals were allowed grazing for 8 h and supplemented concentrate

pellets 300 g/head/d. Intake in grazing animals was determined using chromium III oxide as internal marker. DM intake (g/ kgW^{0.75}) by GR lambs was lower than SF lambs. Lower intake of DM by GR lambs was also reflected in lower DCP intake. The DM, DCP and ME intakes in terms of metabolic body weights by GR lambs were higher than their requirements, which further increased in SF lambs. Digestibility of DM, OM, CP, NDF, ADF, cellulose and hemicellulose was higher in GR animals. Average body weight gain and average daily gain in the SF group was higher than that of the GR group. Lower feed conversion ratio (8.7 v. 11.3 g/g) and higher feed cost of production (40.6 v. 28.2 Rs/kg live weight gain) were observed in SF animals than in GR animals. The SF system of feeding where CF was offered to lambs appeared superior in terms of intake and animal performance. Therefore the SF feeding system can be advocated as an alternative to grazing and supplementation feeding strategy for sheep production, especially where the pastures are highly eroded and need resting for regeneration or curing. Feeding of CF can also be adopted under adverse situations such as drought and famine, which are common phenomena in arid and semi-arid regions.

0275. Deo, Chandra; Central Avian Research Institute, Izatnagar (India)Shrivastava, H P; Central Avian Research Institute, Izatnagar (India)Mandal, A B; Central Avian Research Institute, Izatnagar (India)Tyagi, Praveen K; Central Avian Research Institute, Izatnagar (India). Response of CARI Devendra dual-purpose chicks to supplemental zinc levels. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.921–924 Keywords: growth. Carcasses. Supplements. Zinc. Chicks.

An experiment was conducted in CARI Devendra dual-purpose chicks to find out the optimum level of supplemental zinc. Significantly lower body weight gain was observed in chicks fed with basal diet (29 mg zinc/kg) than those fed diets with 40, 50, 60 and 70 mg Zn/kg during 6-9 and 0-9 weeks of growth phases. However, body weight gain during 0-6 weeks and feed intake during different growth phases did not differ significantly due to different dietary zinc levels. Feed conversion efficiency was also significantly poor in chicks fed the lowest dietary Zn level in comparison to other dietary treatments during 6-9 and 0-9 weeks of age. During 0-6 of age, feed efficiency did not change due to dietary treatments. Hock circumference was significantly lower at low dietary Zn level (29 mg/kg) than other dietary treatments. Pre-slaughter live weight and eviscerated weight were significantly lower at low level of Zn than the other dietary treatments. Shrinkage loss was significantly higher at low Zn level. The liver weight was significantly lower at highest level of Zn. The dressed weight, and giblet, heart and gizzard weights did not change due to dietary treatments. Based on the results it was concluded that a dietary level of 40 mg zinc per kg diet was found optimum for growth performance and carcass yield in CARI Devendra dual-purpose chicks.

0276. Sapkota, D; Assam Agricultural University, Guwahati (India) Gogoi, R; Assam Agricultural University, Guwahati (India)Gohain, A K; Assam Agricultural University, Guwahati (India). Economic advantages of supplementation of dietary *Curcuma longa* during induced aflatoxicosis in broilers. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.942–944 Keywords: aflatoxins. Broiler chickens. *Curcuma longa*. *Curcuma*. Turmeric.

The economic benefits of using dietary *Curcuma longa* (CL) in commercial broilers during experimental aflatoxicosis (300 ppb of aflatoxin B1) were studied for 6 weeks. A control diet (T0) was prepared from conventional feedstuffs and experimental diet (T1) was manufactured by mixing AFB1 00 ppb in the T0. The CL rhizome powder was added at 3 levels i.e., 1.0, 1.5 or 2.0 g/kg into the T1 group. The carcass parameters (dressing, eviscerated and giblet yields%), livability, performance index and economic parameters were severely affected due to aflatoxicosis; however, inclusion of CL in the diet of toxin fed broilers could partially improve these parameters. Among the 3 levels of the herb, a dose of 1.5 g/kg of feed could give the best benefit. It could be concluded that the dry powder of CL can be used to reduce ill effects of aflatoxin, as an ameliorating agent.

0278. Mahanta, S K; Indian Grassland and Fodder Research Institute, Jhansi (India). Performance of crossbred female calves fed different ratios of green berseem and barley straw. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.945–947 Keywords: Barley straw. Calves. Trifolium alexandrinum. Crossbreds.

A study was conducted on growing female calves, fed a mixed ration of green berseem (JHB–146, a new variety) and barley straw with limited supplementation of wheat bran (0.3% of live weight) to record their nutritional and growth performances. Three different combinations of barley straw and green berseem were 50:50, 30:70 and 15:85 (on dry matter basis) fed to the animals of G1, G2 and G3 groups, respectively. Average daily DM intake was 2.47, 2.38 and 2.29% of live weight in calves of G1, G2 and G3 groups, respectively, and the differences were nonsignificant. The digestibility of DM, OM, EE and cellulose were also comparable among the groups ranging from 58.3 to 60.7, 60.1 to 62.1, 46.7 to 48.6 and 53.7 to 59.2%, respectively. However, the digestibility of NDF and ADF was lower and CP was higher in calves of G3 group than G1 group. Average daily CP and DCP intakes were low in G1 group than in both G2 and G3 groups. However, average TDN intakes were comparable among the groups. Live weight gain was higher in calves of those two groups when compared to G1 group. Variation in green berseem to barley straw ratio had no influence on the blood biochemical constituents. Thus the feed intake and nutrient utilization were better and calves sustained around 500 g ADG when fed barley straw and JHB– 146 variety of green berseem in 30: 70 ratio.

0279. Kumar, Anil; Chaudhary Charan Singh University, Meerut (India) Singh, Rajbir; Chaudhary Charan Singh University, Meerut (India) Kumar, Ravinder; Chaudhary Charan Singh University, Meerut (India). Impact of supplementation therapy on subclinical mastitis. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1220-1221 Keywords: Mastitis. Zinc. Copper. Supplements.

Effect of supplementation of zinc, copper and levamisole on incidence of subclinical mastitis was studied. The level of zinc increases significantly after supplementation, 33.33% animals recovered. However, in copper supplemented animals none of the animals showed complete recovery. None of the animals in both the groups developed clinical mastitis. In group 3 i.e. levamisole-supplemented group 83.33% cows remained in subclinical state and others i.e. 16.67% developed clinical mastitis.

0280. Singh, Sultan; Indian Grassland and Fodder Research Institute, Jhansi (India)Kundu, S S; Indian Grassland and Fodder Research Institute, Jhansi (India)Kushwaha, B P; Indian Grassland and Fodder Research Institute, Jhansi (India)Maity, S B; Indian Grassland and Fodder Research Institute, Jhansi (India). Response of Bhadawari buffalo calves to dietary protein levels for intake, nutrients utilization, N balance, nutrient efficiency and growth performance. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1233-1237 Keywords: Calves. Growth. Proteins. Nitrogen content. Nutrition physiology.

The present study was aimed to evaluate the protein requirement of NRC (2001) recommended for small breeds calves gaining 400 g body weight. For this 15 Bhadawari buffalo calves randomly distributed in groups G1, G2 and G3 of 5 animals each were used to assess protein response on their growth. Calves were offered CP and ME as per NRC (2001) in G1, 20% less CP (G2) and 20% more CP (G3) than G1, respectively. Calves were fed sorghum hay and isocaloric concentrate mixtures (2.7 M cal ME) of different protein values (16.20–24.00%). Feed intake g/kg W^{0.75} and % body weight was comparable among dietary groups. DCP (g/kg W^{0.75}) and ME (M cal) intake was lower in G2 than G1 and G3. DM and CP digestibility were lower in G2 than G1 and G3 dietary groups. N balance (g/d) was lower in G2 than G3. Calves growth rate was comparable and ranged 407.64±9.82 to 430.32±31.94 g across diets. CPCR and MECR efficiency for weight gain varied (P<0.05) across diets. For calves 20% less CP than NRC (2001) is adequate for 400 g growth rate/d without affecting the feed intake and cell wall digestibility.

0281. Thakur, S S; National Dairy Research Institute, Karnal (India) Shelke, S K; National Dairy Research Institute, Karnal (India). Growth performance and nutrient utilization of Murrah buffalo calves fed ration supplemented with bypass fat prepared from soybean acid oil. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1238-1241 Keywords: Calves. Fatty acids. Growth. Nutrition physiology.

The present experiment was conducted to study the effect of supplementing Ca salts of soya acid oil fatty acids on growth performance and nutrient utilization in buffalo calves. Female Murrah buffalo calves (16) of 6–8 months of age were randomly divided into 2 groups of 8 each (95.00, 94.88 kg BW) and fed concentrate, wheat straw and green oat fodder in 50:15:35 proportion (control group), the same ration plus Ca salts of soya acid oil fatty acids supplemented at 4% of DMI (experimental group) for 120 days. Average body weight gain in experimental group was 69.31 kg, which was 4.40% higher over that of the control group (66.39 kg). Average daily gain was also higher in experimental group (577.60 g/d) as compared to that of control (553.10 g/d). DMI/kg BW gain was 6.67 and 6.00 in control and treatment groups, respectively. There was no effect on DMI and CPI, whereas, TDNI was higher in experimental group as compared to that of control. The digestibility coefficients of DM, OM and CP were similar in both groups except EE which was higher in treatment (87.55%) as compared to that of the control group (78.63%). There was no effect of bypass fat feeding on blood glucose, whereas blood NEFA concentrations and total cholesterol were higher in experimental group as compared to that of the control group. Body composition, viz. water, protein, fat and ash contents, were similar in both groups. It could be concluded that supplementation of Ca salt of soya acid oil fatty acids at 4% of DMI improved the growth rate in Murrah buffalo calves owing to higher TDN intake.

0282. Elanchezian, N; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India)Reddy, D V; Rajiv Gandhi College of Veterinary and Animal Sciences, Puducherry (India). Nutritional evaluation of Co 3 hybrid Napier grass in goats. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1253-1253
Keywords: Pennisetum purpureum. Goats. Nutrition physiology. Digestibility. Nutritive value. Pennisetum glaucum.

Co 3 variety of hybrid Napier green fodder (21.4% DM) was evaluated in a metabolism experiment in goats (BW 13.58±0.14 kg). The fodder contained 10.38, 2.05, 64.38, 39.57, 4.26, 0.5 and 0.4%, respectively, of CP, EE, NDF, ADF, ADL, Ca and P. The dry matter (DM) intake of goats was 344±14 g/day, which came to 2.53 as % of body weight (BW) and 49 g per kg metabolic body weight. DCP and TDN of the fodder was 6.65% and 49.55% respectively. The experimental animals were in positive nitrogen, calcium and phosphorus balance. Thus Co 3 variety of hybrid Napier grass could only meet the digestible protein requirement of the goats and there was a need for supplementary feed to meet the deficit in energy requirement.

0283. Singh, B P; Indian Veterinary Research Institute, Izatnagar (India)Sharma, M C; Indian Veterinary Research Institute, Izatnagar (India)Tiwari, Rupasi; Indian Veterinary Research Institute, Izatnagar (India). Feeding resources and management among poor livestock keeper : A field study in linkage villages. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1263-1264
Keywords: Water buffaloes. Ownership. Feeding. Villages.

The livestock keepers fed their livestock according to their socio-economic and socio-cultural status. Largely their livestock fed on crop residues like grasses, wheat and paddy straw, sugarcane top and left-over feed of other animals and rarely adopt recommended feeding technologies, because of non-availability, high cost and ignorance. The feeding of paddy straw was mainly prevalent in study area which needs physical, chemical or biological treatment to enrich its quality and palatability. Extension education programme played a vital role in enhancing the knowledge level among livestock owners about improved livestock feeding.

0284. C S Randhawa; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Pal, Heigo; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Randhawa, S S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Uppal, S K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Influence of age, season, lactation on haematology and iron biochemistry of crossbred cattle. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1007–1010
Keywords: Crossbreds. Cattle. Binding proteins. Iron. Transferrins. Blood.

Hematology and iron metabolism profile was determined in crossbred cattle in relation to age, season and lactation. Mean values of PCV and MCV were significantly higher in heifers (1–3 years) and PCV in old (9 years)

cattle. The plasma iron concentration was lowest in heifers. The values of Hb, PCV, TEC, plasma iron and total iron binding capacity were lower in lactating and MCHC was higher in lactating than non-lactating cows. Mean PCV and MCV was high during winter and spring season as compared to summer and rainy season. Mean MCH value was the lowest in rainy season whereas MCHC was the highest in summer. Season did not affect plasma Fe, total iron binding capacity and per cent transferrin saturation. Plasma Fe concentration varied from 87–269.6 $\mu\text{g}\cdot\text{dl}^{-1}$, total iron binding capacity varied widely from 181.6 to 887 $\mu\text{g}\cdot\text{dl}^{-1}$ and transferrin saturation from 18.2 to 80% in cattle.

0285. Randhawa, C S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Randhawa, S S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Uppal, S K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Plasma mineral status of buffaloes in Punjab. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1024–1027 Keywords: Surveys. Water buffaloes. Calcium. Cobalt. Hypophosphataemia. Iron. Manganese. Zinc. Mineral content.

A base-line survey was conducted to assess plasma concentrations of calcium, phosphorus, magnesium, iron, zinc, manganese and cobalt in buffaloes. Per cent buffaloes with plasma calcium concentration below 2.0 mmol/l were 78.2 and 87.3. at the organized and rural dairy units, respectively. Hypophosphatemia was detected in 26.7. animals of rural dairy units compared to 11.1. of the organized farm. Prevalence rate of hypophosphatemia was highest (31.2.) in mature buffaloes (6 years). The plasma concentrations of manganese and cobalt were low in 48.4 and 19. of the animals of rural dairy units, respectively. The concentrations of iron and zinc were within normal limits in all the animals. Hypophosphatemia was most common in Ferozepur district. The proportion of buffaloes showing low plasma concentrations of calcium was maximal in Ludhiana, and of manganese and cobalt in Jalandhar.

0286. Bohra, H C; Central Arid Zone Research Institute, Jodhpur (India)Patel, A K; Central Arid Zone Research Institute, Jodhpur (India)Kaushish, S K; Central Arid Zone Research Institute, Jodhpur (India). Palatability, digestibility of various constituents and nitrogen retention in Marwari sheep offered *Salicornia bigelovii* biomass and *Cenchrus ciliaris* straw mixed diet. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1050–1053 Keywords: Digestibility. Feed intake. Halophytes. Nitrogen content. *Salicornia*. *Cenchrus ciliaris*. *Cenchrus*. Palatability.

Feeding and metabolism trials were conducted to assess palatability of *Salicornia bigelovii* biomass (SB) and digestibility of its various constituents in sheep. SB (50%) diet was fairly palatable in sheep. When the sheep was offered different diets having SB and *Cenchrus ciliaris* (CC) straw using cafeteria system, the sheep always preferred the diet that contained minimum level of *Salicornia* biomass. Daily dry matter intake in SB (75%) and CC diet did not vary. However, daily water intake as well as urine out put was considerably high in SB (75%) fed animals due to high sodium chloride content of the SB diet. Dry matter, cell contents and crude protein digestibility of SB (75%) diet was high, whereas, in CC diet the digestibility coefficients for organic matter, cell-wall constituents, acid detergent fibre and hemicelluloses were on the higher side. Incorporation of SB (75%) in CC diet increased salt load, resulted in high water intake. The major advantage of SB incorporation in the CC based diet was seen in the form of high crude protein intake and its digestibility. This was also apparent in the nitrogen balance where the sheep fed on SB (75%) showed a positive (+1.22±0.150 g day⁻¹) nitrogen balance whereas the animals fed on CC alone exhibited a negative balance (-4.71±0.874 g day⁻¹). The findings emanated from this study show the prospects of using *Salicornia* diet in future for increasing protein status of the animals foraging upon salinity affected desert rangelands.

0287. Patel, M; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Sharma, R J; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, A; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Tiwari, D P; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Prabakaran, P; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Panja, Anindita; Govind Ballabh Pant University of Agriculture and Technology,

Pantnagar (India). Effect on carcass characteristics of pigs fed with different level of jaggery filter cake alongwith concentrate. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1054–1057 Keywords: Carcasses. Filtration. Sugar. Swine.

Farmers often feed Jaggery filter cake (scum/maili) to pigs in sugarcane belt during winter. Jaggery filter cake (JFC) is a good unconventional source of energy as well as minerals. Thus, present study was carried out to study the effect of different levels of JFC feeding on carcass traits in pigs. An experiment was designed using 30 large White Yorkshire piglets (3.5 month old), randomly divided and maintained on 5 dietary treatment groups, viz. group 1:concentrate only, group 2: concentrate + 250g JFC, group 3: concentrate + 500g JFC, group 4: concentrate + 750g JFC and group 5: ad lib. JFC only. Jaggery filter cake supplementation was increased in the ratio of 50:100:150 g in groups 2, 3, 4 respectively, every fortnight during growing stage and every week during finishing stage. Three animals from each group were slaughtered for carcass traits. Highly significant difference was observed in dressed carcass weight between group 5 and other treatment groups. However, no significant difference was found between group 1 to 4. The dressing % was nonsignificant between different treatment groups. The maximum carcass length was observed in group 2 followed by group 4, 1, 3 and 5. There was a significant difference in carcass length between group 5 and others. Supplementation of JFC alongwith concentrate increased the back fat thickness, whereas on sole feeding of JFC, the back fat thickness was reduced. Sole feeding of JFC reduced the loin eye area. However, back fat at 10th rib did not show any particular trend. Back fat thickness at 10th rib was almost same in all groups except group 4 which differed significantly from others. Addition of JFC reduced the percentage of boston butt, picnic shoulder and ham. Maximum edible offal weight was recorded in group 2 followed by group 4, 3, 1 and 5. It can be concluded that supplementation of JFC with concentrate improved the carcass traits.

0288. Murugan, M; College of Veterinary and Animal Sciences. Kerala (India)Mathew, Joseph; College of Veterinary and Animal Sciences. Kerala (India)T Sivakumar; College of Veterinary and Animal Sciences. Kerala (India)Gnanaraj, P Tensingh; College of Veterinary and Animal Sciences. Kerala (India). Effect of different feeding system on the performance of crossbred pigs. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1058–1060 Keywords: Growth. Carcasses. Concentrates. Swine.

A growth trial was conducted to evaluate the performance of Duroc(Landrace×desi) pigs under different feeding systems. Weaned piglets (24) were selected at random and they were divided into 4 groups comprising 6 animals each. First group (T1) was maintained on farm concentrate. Piglets belonging to T2, T3 and T4 were fed with swill feed. In addition to this, T3 and T4 group were supplemented with inorganic and organic minerals 1% level on dry matter basis respectively. There was no significant difference in monthly body weights, body measurements, ADG and average daily feed intake between T1 and T2. T4 was significantly better than other treatment groups. Feed efficiency was significantly better on T1 and lower on T2, T3 and T4. T4 attained significantly higher slaughter weight, hot carcass weight and carcass length than the other treatment groups. T3 group attained significantly higher slaughter weight, hot carcass weight and carcass length than the T2 and T1 treatment groups. No significant difference between T1 and T2 was noticed. T1 had significantly higher dressing percentage; lesser back fat thickness and gut weight than other treatment groups. There was no significant difference between T2, T3 and T4 in dressing percentage and back fat thickness. T2 had significantly lesser loin eye area and meat-bone ratio than other treatment groups. It was concluded that swill feed was found to be equally effective compared to concentrate feed in promoting growth of the fatterer pig production existing under field conditions. Carcass characteristics and growth can be improved by supplementation of minerals in the diet of fatterer pigs.

0289. Pandey, Poonam; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Pandey, A K; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Effect of different antibiotics and probiotics on in vitro dry matter digestibility and methane production. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1078–1080 Keywords: Antibiotics. Digestibility. In vitro fertilization. Probiotics.

The efficiency of 5 antibiotics and 2 probiotics was evaluated on the basis of in vitro DMD, TVFA, NH₃-N and methane production. The concentrate mixture was supplemented with respective antibiotics 20 mg/kg of concentrate and probiotics 5 g/kg of concentrate mixture. It is concluded from the experiment that kanamycin acid sulphate (locally available and non ionophore antibiotics) and Lactobacillus sporogense + Saccharomyces cerevisiae SC 47 improve the in vitro DMD% and TVFA concentration, and significantly reduce ammonia and methane production. These antibiotics and probiotics can be further tested and incorporated in ruminants ration as feed additives.

0290. Pandey, Poonam; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Mishra, Anoop; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Agrawal, I S; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Influence of dietary supplementation of antibiotic and probiotic on rumen nitrogen metabolism, blood glucose and certain hematological parameters in crossbred bullocks. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1081–1082 Keywords: Antibiotics. Blood. Probiotics. Rumen digestion.

Rumen fistulated crossbred bullocks (3) were provided 3 dietary treatments viz. T1 (control), T2 (antibiotic) and T3 (probiotic) in a latin square switch over design. In T2, the concentrate mixture was supplemented with antibiotic kanamycin 0ppm/head/day and in T3, it was supplemented with probiotic 7 g/head/day. There was no change in ruminal pH in T2, whereas pH was increased significantly in T3. In the T2, ruminal NH₃-N concentration decreased significantly, whereas TCA-ppT-N concentration increases significantly in T2 and T3. Blood glucose, hemoglobin, total erythrocyte count, total leukocytes count and packed cell volume percentage were not affected with antibiotic or probiotic supplementation. It was concluded that dietary supplementation of antibiotic and probiotics may provide a favorable rumen environment and improvement in rumen nitrogen metabolism which will lead to overall improvement in production efficiency of animals.

0291. Sharma, M. C.; Indian Veterinary Research Institute, Izatnagar (India)Joshi, Chinmay; Indian Veterinary Research Institute, Izatnagar (India)Das, Gunjan; Indian Veterinary Research Institute, Izatnagar (India)Tiwari, Rupasi; Indian Veterinary Research Institute, Izatnagar (India). Micronutrient status in soil, fodder, serum and haematobiochemical profile in some districts of central Uttar Pradesh. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1083–1086 Keywords: Hormones. Minerals. Vitamins. Soil deficiencies. Forage.

A survey was conducted to assess the serum mineral, haemato-biochemical, hormone and vitamin status in buffaloes in some districts of Central Uttar Pradesh. It was observed that the mainly Ca, Mg and P, Cu and Zn were deficient and below the critical levels. Haemato-biochemical profile showed significant decrease in Hb, TEC, while the values of TLC were slightly higher in deficient buffaloes. The values of serum enzymes, viz. serum aspartate aminotransferase, serum alanine aminotransferase and ceruloplasmin were lower, whereas that of serum alkaline phosphatase was higher. The values of thyroxine hormone (T₃ and T₄) and vitamin (A and E) were significantly lower in mineral deficient animals. It is concluded that the mineral deficient animals should be substituted by specific minerals for optimum production.

0292. N Chand; Indian Veterinary Research Institute. Izatnagar (India)Pandey, N N; Indian Veterinary Research Institute. Izatnagar (India)Mondal, D B; Indian Veterinary Research Institute. Izatnagar (India). Effect of timing and frequency of colostrum feeding on immunoglobulin G status and susceptibility to colibacillary diarrhoea in neonatal calves. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.653-657 Keywords: Calves. Colostrum. Diarrhoea. Escherichia coli. Escherichia. Immunoglobulins.

Calves (42) immediately after birth, of an organized dairy farm were utilized for the study under 7 groups of 6 calves each. These calves were fed colostrum by either pail feeding or nipple feeding or esophageal intubation 1.5 litre per single feeding with different time and frequency. The colostrum fed to each calf belonged to respective dam. The maximum concentration of serum IgG (20.33±1.70 mg/nil) was seen in calves receiving first milking colostrum at 2 and 8 h of birth. Calves receiving second milking colostrum at 16 h of birth in

addition to first milking colostrum at 2 and 8 h of birth do not benefited in terms of serum IgG values, which were comparable (21.83 ± 1.61 mg/mi) to the earlier group without any significant difference. Availability of first milking colostrum as single feeding at 2 h of birth to the calves resulted in serum IgG concentration of 15.00 ± 1.83 mg/mi, which was adequate to provide disease resistance. These calves did not suffer from E. coli diarrhoea and had maximum weight gain up to 3 month of study period. Calves which received first milking colostrum either at 6h or at 8h as single feeding had serum IgG concentration of 10.66 ± 1.33 mg/mi and 8.95 ± 1.16 mg/mi respectively which was below the required serum IgG concentration with inadequate protection against colibacillosis. The calves receiving second milking colostrum at 12 hour as single feeding had very low serum IgG (4.75 ± 0.43 mg/mi) concentration with maximum incidence of E. coli diarrhoea among the colostrum fed animals of different groups. The completely colostrum deprived calves had nondetectable serum IgG up to 36 h of birth and suffered from highest occurrence of diarrhoea with poor body weight gain.

0293. Sharma, Jyoti; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, Anil; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Tiwari, D P; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Mondal, B C; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Effect of dietary supplementation of calcium, copper and manganese on production performance of dairy cattle in Pithoragarh district of Uttarakhand. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.686-691 Keywords: Calcium. Cattle. Copper. Manganese. Milk yield. Reproductive performance.

This study examined the effect of strategic dietary supplementation of calcium, copper and manganese on reproduction and lactation performance of cattle in Pithoragarh district (Hill region) of Uttarakhand. The calcium, copper and manganese were supplemented in the form of feed (mineral) mixture supplement containing maize 34%, deoiled mustard cake 16.5%, deoiled soybean meal 33.5%, dicalcium phosphate 15.32%, copper sulphate 0.16% and manganese sulphate 0.52%. The experimental animals were provided 250g of feed (mineral) mixture daily so as to supply 11.3 g calcium, 96 mg copper and 320 mg manganese for 60 days over and above the quantity received by the animals through feeds and fodder provided by the farmers. Dietary supplementation of Ca, Cu and P made 66.67% improvement in anoestrous animals and 50% improvement in ameliorating the incidence of repeat breeding cases. Milk yield increased from 3.69 to 4.22 litres in Bharkatia and 5.65 to 6.19 litres in Lelu village. The SGPT and SOOT activities, serum total protein and globulin concentration increased significantly and reached to normal range in all categories of animals, whereas, serum cholesterol concentration decreased significantly in all categories of animals due to strategic mineral supplementation. Calcium, copper and manganese concentration in blood serum of all categories of animals also increased significantly and reached above the critical levels in animals due to dietary supplementation of calcium, copper and manganese. It may be concluded that dietary calcium, copper and manganese supplementation in cattle is necessary for improving the milk yield, health and reproductive performance of cattle under existing feeding practices/system in Pithoragarh district of Uttarakhand.

0294. Gupta, J J; ICAR Research Complex for NEH Region, Meghalaya (India)Bardoloi, R K; ICAR Research Complex for NEH Region, Meghalaya (India)Reddy, P B; ICAR Research Complex for NEH Region, Meghalaya (India)Das, Anubrata; ICAR Research Complex for NEH Region, Meghalaya (India). Performance of crossbred pigs fed on raw and boiled sweet potato tuber at various levels at different stages of growth. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.696-699 Keywords: Swine. Sweet potatoes. Tuber (truffles). Growth. Nutrient intake. Digestibility.

Feeding studies were conducted to evaluate the utilization of sweet potato tubers (SPT) in the rations of crossbred (HampshirexKhasi local) pigs. Experiments were conducted in two phases by feeding raw sweet potato tuber (RSPT) based diets in the first phase and boiled sweet potato tuber (BSPT) based diets in the second phase. In first phase, two experiments were conducted. First experiment was with pigs of 10 kg body weight and the second was with pigs of 15 kg body weight. The experimental diets contained RSPT at 0 (T1), 40 (T2) and 60 (T3) percent levels on DM basis. In the second phase, first experiment was conducted to study

the performance of pigs by feeding ration either without (T1) or with BSPT at 40% level (T2). In the second experiment BSPT was included in diets at 0 (T1), 40 (T2) and 60 (T3) percent levels on DM basis. Irrespective of whether SPT was offered in raw or boiled form, the overall dry matter intake (DMI) increased with inclusion of SVF at 40% level but then it decreased at 60% level. In RSPT based diets, DM digestibility (DMD) decreased (P<0.01) at 60% level but CP digestibility (CPD) decreased even at 40% level of inclusion. In BSPT based diets, DMD increased at 40% level and was on par with control at 60% level where as CPD was maintained up to 40% level and then decreased at 60% level. Inclusion of RSPT in the diet decreased the average daily weight gain (ADG) with the effect being significant at 60% level where as boiling of SPT increased (P<0.05) the weight gain up to 40% level of inclusion and was on par at 60% level. It is therefore concluded that RSPT can be included up to a maximum of 40% level where as boiling of SPT increased its nutritive value and BSPT can safely be incorporated up to 60% level on DM basis in swine diets.

0295. Gupta, Aparna; Punjab Agricultural University, Krishi Vigyan Kendra (Ropar), Ludhiana (India) Kaushal, J R; Punjab Agricultural University, Krishi Vigyan Kendra (Ropar), Ludhiana (India). Evaluation of feeding practices in crossbred cattle by progressive dairy farmers of Punjab - an on-farm study. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.710-715 Keywords: Cattle. Feeding. Crossbreds. Lactation. Punjab.

An on-farm study was conducted to evaluate the feeding schedule of crossbred cows, maintained by a progressive dairy farmer. 12 selected animals were divided into mid, early and late lactation groups of 4 animals each. During the study period, May to September, environmental temperature ranged between 34 and 41°C (max.) and 20 and 28°C (min) and relative humidity 4 and 83%. Comparison between the nutrients offered and those required as per NRC standards revealed a great discrepancy. The level of feeding (%) by the farmer to early, mid and late lactation groups were DM 131, 114 and 120; TDN 120, 109 and 107; ME 115, 104 and 105; RDP 92, 91 and 81; UDP 119, 115 and 140; Ca 156, 144 and 185; P 267, 265 and 285, respectively of that of requirement by NRC, 1988. High intake of nutrients and DM was adding to the heat stress discomfort during the months of June to August when the RH was 70 to 80 percent and maximum temperature 34±5°C. Modifications (reducing the EE content of concentrate mixture, reducing DM intake, urea incorporation and raising the level of feeding of concentrate) were made in the feeding schedule and a test trial with 10 animals (5 animals in test and 5 in control group) was performed with minimal changes in all other factors (stages of lactation, season, fodder type) and it was observed that the animals under test group produced 19.03 kg milk in comparison to 16.80 kg in the start of the test period, i.e. an increase of 2.24 kg/animal/d (13.3%). In the 5th week while there was a drop of 800 g in milk production over that of the previous week's production in the control group, the drop in test group was only 180 g/animal/d. There was an increase of Rs 12.33 in income/animal/d. Interestingly, this income increased to Rs 16.43 during the 5th week when, the animals in the control group were more affected by the heat stress than those in the test group.

0296. Malik, P K; National Dairy Research Institute, Karnal (India) Singhal, K K; National Dairy Research Institute, Karnal (India). Effect of lucerne (*Medicago sativa*) fodder supplementation on nutrient utilization and enteric methane emission in male buffalo calves fed on wheat straw based total mixed ration. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.416-421 Keywords: Calves. Lucerne. Methane. Nutrients. Digestibility. Saponins. Forage.

Saponin content of lucerne (*Medicago sativa*) fodder was estimated at 3, viz. I, II and III cuts. Saponin content at II cut (flowering stage) was highest which decreased in the subsequent cut almost to the level of first cut. Male Murrah buffalo calves (6) were initially fed on wheat straw based total mixed ration (TMR-1) consisting R: C as 60:40 and data were recorded thereafter, these animals were shifted on isonitrogenous TMR-2 having 30% incorporation of lucerne fodder (II cut) as source of saponins (2% on DM basis) in TMR-2 replaced wheat straw partially maintained the R: C ratio similar to TMR-1 (60:40). DM intake, nutrient utilization and enteric methane emission were studied on both feeding regimes. DM intake (kg/d) in buffalo calves was higher on TMR-2 than on TMR-1, similarly on uniform basis (kg/100 kg bw) it was also higher on feeding TMR-2. Nutrient digestibility and nitrogen intake on feeding TMR-2 was higher than that on feeding TMR-1, which

resulted in higher nitrogen excretion through faeces and urine. Methane emission on feeding TMR-1 and TMR-2 was 18.11 and 12.45 g/kg DMI, respectively, showed a reduction of 32% due to the addition of 30% lucerne fodder (II cut) in TMR-2. Thus, the saponins supplied through lucerne fodder (total intake 29.58 g/d) decreased methane emission in buffalo calves. GE loss in the form of methane was more on feeding TMR-1 (5.73%) than that on TMR-2 (3.93%). The lower loss of GE in form of methane on feeding TMR-2 showed that incorporation of lucerne fodder to straw based ration can increase DMI, nutrient utilization in one hand and mitigate methane emission on another. As production of lucerne fodder is a common and a traditional practice in India, therefore, incorporation of lucerne fodder as a source of protein in total mixed ration seems more practical and promising for the mitigation of methane than the other strategies. Thus, there is urgent need to explore natural feeds and herbs having saponins and safe level of their incorporation in the ration.

0297. Kumar, Arun; CCS Haryana Agricultural University, Hisar (India) Singh, Rajender; CCS Haryana Agricultural University, Hisar (India) Yadav, R S; CCS Haryana Agricultural University, Hisar (India). Effect of feeding different source of protein on feeding behaviour and performance of buffalo calves. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.422-425 Keywords: Water buffaloes. Calves. Feeding habits. Proteins.

The study was conducted on 18 buffalo calves of about 1-3 months of age to find the effects of 3 different calf starters. The calves were divided into 3 groups of 6 calves in each group on the basis of their body weight and age. These groups were randomly allotted to 3 treatments, viz. T1 group, GNC was the protein source, T2 group, soybean meal was the source of protein, and T3 group, mustard cake with fish meal (10%) as protein source. The resting time was significantly higher in T2 as compared to T1 and T3. However, the eating and rumination time were not significantly influenced by treatments. The time spent on eating and resting was significantly low in T3 as compared to T1 and T2 during day time. The time spent on rumination during day time was significantly higher in T2 as compared to T1 and T3. The resting time during night time was significantly higher in T2 as compared to T1 and T3. However, the eating and rumination time was significantly different between treatments during night time. The average daily body weight gain was significantly higher in T2 as compared to T1 and T3. However, no significant difference was observed in T1 and T3. The body length, height and abdominal girth were not significantly influenced by treatments. Whereas heart girth was significantly higher in T2 as compared to T1 and T3. The cost per kg body weight gain was less in T2 followed by T1 and T3.

0298. Singh, Sultan; Indian Grassland and Fodder Research Institute, Jhansi (India) Katiyar, D S; Indian Grassland and Fodder Research Institute, Jhansi (India) Theodorou, M K; Indian Grassland and Fodder Research Institute, Jhansi (India) Prasad, S V Sai; Indian Grassland and Fodder Research Institute, Jhansi (India) Mishra, U S; Indian Grassland and Fodder Research Institute, Jhansi (India) Bhaskar, R B; Indian Grassland and Fodder Research Institute, Jhansi (India) Pandey, K C; Indian Grassland and Fodder Research Institute, Jhansi (India) Verma, O P S; Indian Grassland and Fodder Research Institute, Jhansi (India) Mishra, A K; Indian Grassland and Fodder Research Institute, Jhansi (India). Nutritional and morphological attributes of stay green vis-à-vis go-brown sorghum cultivars at different stages of maturity. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.426-432 Keywords: Forage. Yields. Sorghum. Sugar.

Six stay green (SG) varieties (M 35-1, A 2267-2, SPV 1284, CSV 15, GSS 2 and B 24) and four go brown (GB) varieties (IS 4859, HD 20, J Sel 10 and IS 2179) were evaluated for nutritional constituents, in vitro dry matter digestibility (IVDMD), morphological attributes, fodder yield and sugar contents at 5 different stages of maturity (50% flowering-1st, physiological maturity-2nd, 20 days after physiological maturity-3rd, 40 days after physiological maturity-4th, and 60 days after physiological maturity-5th). The accumulation of dry matter (DM) in leaf of SG sorghum was significantly lower at initial 3 stages of growth. DM contents in stem part of SG cultivars were significantly lower than GB. Stem fraction of SG exhibited significantly lower ligno-cellulose contents compared to GB. NDF and ADF contents were 2-12 and 2-8 units lower in stem of SG than GB in different stages of crop maturity. Leaf width and leaf length was significantly higher in SG than GB at

initial 3 stages of growth. Plant height was significantly higher in GB than SG cultivars. Numbers of dried leaves were lesser in SG than GB and increased with the advancing stage of maturity in both type of sorghum. IVDMD of stem part in SG was 3.0 to 9.5 unit more than GB across the growth stages. GFY yield was significantly higher in SG vis-à-vis GB at all stages of maturity, while sugar contents were significantly more in SG than GB in stages after physiological maturity. SG and GB sorghum had maximum accumulation of sugar at third stage of crop growth. SG cultivars had more CP, low fibre with higher IVDMD, sugar contents and fodder yield than GB.

0299. Nakajothi, N.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Nanjappan, K.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Selvaraj, P.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Jayachandran, S.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Visha, P.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Amelioration of stress in broiler chickens by feeding amla. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1116–1119 Keywords: Broiler chickens. Feeding. Stress.

An experiment was carried out to test the efficacy of supplementing amla (*Emblica officinalis*) in broiler chickens diet from 1 to 6 weeks of age. Stress was induced by injecting adrenocorticotrophic hormone for 5 days from 22 d of age 3 IU / kg body weight. Amla fruits were dried and pulverized. The dietary treatments were T1 (standard diet with 0.0% amla), T2 (standard diet with 0.5% amla), T3 (standard diet with 1.0% amla), T4 (standard diet with 2.0% amla), T5 (standard diet with 250 mg/kg diet vitamin C). Blood samples were collected on d 21, 28 and 42 to measure the plasma antioxidants such as glutathione peroxidase (GSH-Px), reduced glutathione (GSH), superoxide dismutase (SOD), malonaldehyde (MDA) and plasma corticosterone and serum thyroxin. Results showed that MDA level was reduced significantly in amla and vitamin C fed groups compared to control. However, GSH-Px, SOD, GSH and thyroxin level did not vary significantly between treatment groups. The plasma corticosterone level was significantly reduced in amla and vitamin C supplemented groups compared to control. It can be concluded that supplementing broiler diet with amla powder at 0.5% or at higher level can act as antistress agent in broiler chicken production.

0300. Dass, R.S.; Indian Veterinary Research Institute, Izatnagar (India)Kumar, Ripusudan; Indian Veterinary Research Institute, Izatnagar (India)Bhadane, K.P.; Indian Veterinary Research Institute, Izatnagar (India)Tiwari, R K; Indian Veterinary Research Institute, Izatnagar (India)Mudgal, Vishal; Indian Veterinary Research Institute, Izatnagar (India)Garg, A.K.; Indian Veterinary Research Institute, Izatnagar (India)Varshney, V.P.; Indian Veterinary Research Institute, Izatnagar (India). Effect of zinc-sulphate treated soybean-meal feeding on nutrient utilization and blood metabolic profile in male Murrah buffalo calves. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1156–1160 Keywords: Water buffaloes. Blood. Nutrition physiology. Soybean meal. Zinc sulphate.

An experiment was conducted on 15 male buffalo calves (18-months-old, 263.0±7.8 kg mean body weight), divided into 3 groups of 5 calves in each, to elucidate the effect of feeding zinc-sulphate treated soybean-meal on nutrient utilization, nitrogen balance and blood metabolic profile. All the buffalo calves were fed on wheat straw and concentrate mixture to meet their nutrient requirement. Concentrate mixture was having 25% untreated, 1% and 2% zinc sulphate treated soybean meal in group 1, 2 and 3, respectively. This feeding practice lasted for 60 days. A metabolism trial was conducted to know the digestibility of nutrients and nitrogen balance at the end of feeding trial. Blood was collected to estimate the blood biochemical profile from all the animals after 60 days of experimental feeding. Results revealed no significant difference in the digestibility of proximate principles and fiber fractions and nitrogen balance. Results revealed non-significant difference in serum concentration of total protein, albumin, globulin, urea, calcium and phosphorus, whereas the concentration of serum cholesterol and blood glucose decreased and serum zinc level increased significantly in group 2 and 3 in comparison to control group. The activity of alkaline phosphatase was significantly higher in calves fed concentrate mixture having zinc sulphate treated soybean meal than the control group calves. There was no significant difference in plasma concentration of T3, whereas levels of

plasma T4, testosterone and insulin were significantly higher in groups 2 and 3 as compared to group 1. It may be concluded that addition of zinc sulphate treated soybean meal in concentrate mixture of buffalo calves decreased blood glucose and serum cholesterol concentration and increased the levels of serum alkaline phosphatase, zinc, and plasma hormones like insulin, testosterone and thyroxine, though there was no significant effect on weight gain, digestibility of nutrients and nitrogen balance.

0301. Dubey, C.S.; GovindBallabh Pant University of Agriculture and Technology, Pantnagar (India)Mondal, B.C.; GovindBallabh Pant University of Agriculture and Technology, Pantnagar (India)Tiwari, D.P.; GovindBallabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, Anil; GovindBallabh Pant University of Agriculture and Technology, Pantnagar (India)Yadav, C.L.; GovindBallabh Pant University of Agriculture and Technology, Pantnagar (India). Effect of plane of nutrition on haematobiochemical constituents and serum enzyme activity in sheep infected with *Haemonchus contortus*. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1161–1164 Keywords: Feeding level. *Haemonchus contortus*. *Haemonchus*. Sheep.

Adult Muzaffarnagari sheep (18) of 11–13 months of age infected with *Haemonchus contortus* were divided into 3 groups of 6 animals each, and were fed 3 levels of concentrate mixture (groundnut cake and wheat bran in 70:30 ratio), i.e. low plane (200 g concentrate), medium plane (300 g concentrate) and high plane (400 g concentrate) to groups 1, 2 and 3, respectively, along with ad lib. mixed green fodder (green maize and grasses) to each animal for 90 days. Blood samples were collected from each animal on 0, 30th, 60th and 90th day post-feeding to see the effect of plane of nutrition on haematobiochemical constituents in sheep infected with *Haemonchus contortus*. The total serum protein, albumin and globulin concentrations in different groups were similar. The sheep in group 1 showed significantly higher blood glucose level in comparison to group 3, however, on 30th day it was also significantly higher in group 2 than that in group 3. The blood cholesterol and haemoglobin levels did not differ significantly in sheep fed different planes of nutrition although packed-cell volume in groups 2 and 3 was significantly higher than that in group 1 on 60th day of feeding. There was no significant difference in packed-cell volume between groups 2 and 3. The overall mean serum glutamate oxaloacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) activities were significantly higher in sheep of groups 2 and 3 than that in group 1 but there were no differences between groups 2 and 3. The serum pepsinogen and alkaline phosphatase activities were not affected in sheep due to different planes of nutrition. The overall mean faecal egg counts were significantly lower in groups 2 and 3 than that in group 1. It is concluded that protein rich diet leads to reduced establishment and fecundity of the worms in sheep infected with *Haemonchus contortus*.

0302. Panda, A.K.; Project Directorate on Poultry Rajendranagar, Hyderabad (India)Raju, M.V.L.N.; Project Directorate on Poultry Rajendranagar, Hyderabad (India)Rao, S.V. Rama; Project Directorate on Poultry Rajendranagar, Hyderabad (India)G. Shyam Sunder; Project Directorate on Poultry Rajendranagar, Hyderabad (India)Reddy, M.R.; Project Directorate on Poultry Rajendranagar, Hyderabad (India). Effect of graded levels of formic acid on gut microflora count, serum biochemical parameters, performance and carcass yield of broiler chickens. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1165–1168 Keywords: Broiler chickens. Carcasses. Formic acid.

The influence of formic acid (FA) supplementation in diets on the performance of broiler chicken was evaluated. Control starter (0–3 wk) and finisher (4–6 wk) diets were formulated to contain 2900 kcal ME/kg with 22% CP and 3000 kcal ME/kg with 20% CP, respectively. In addition, 6 experimental diets were constituted with the inclusion of 50 g antibiotic (furazolidone)/ quintal or FA at 0.2, 0.4, 0.6, 0.8 or 1.0% to the control diet. Each diet was offered ad lib. in cages to 6 replicates of 6 chicks each from day-old to 6 wk of age. Formic acid at 0.6% of the diet significantly improved the body weight gain and feed conversion ratio, which was as par with the antibiotic supplemented group. Increasing the concentration of FA from 0.6 to 0.8% further improved both the above parameters with no subsequent improvement thereafter. The digestibility of crude protein and calcium and their concentrations in serum, and dressed yield were significantly higher and

abdominal fat content was lower in the dietary groups that contained 0.6 to 1% FA. Dietary addition of FA at 0.6% and above reduced the *Escherichia coli* counts in crop but not in the small intestine and caecum. Higher concentration of FA (0.8% and 1%) was more beneficial in reducing the *Escherichia coli* counts in small intestine (SI) and caecum and was as par with the antibiotic group. From this study, it is concluded that 0.8% formic acid in the diet of broiler chickens elicited optimum performance and provided better results than antibiotic (furazolidone).

0303. Jadhav, N.V.; Karnataka Veterinary Animal and Fisheries Sciences University, Bidar (India) Suranagi, M.D.; Karnataka Veterinary Animal and Fisheries Sciences University, Bidar (India) Anjaneya, S.N.; Karnataka Veterinary Animal and Fisheries Sciences University, Bidar (India) Chandra, Prakash; Karnataka Veterinary Animal and Fisheries Sciences University, Bidar (India) Mallikarjunappa, S.; Karnataka Veterinary Animal and Fisheries Sciences University, Bidar (India). Blood and serum activities in commercial broiler chickens fed with partial replacement of soybean and dicalcium phosphate feeds supported with microbial phytase. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1169–1171 Keywords: Broiler chickens. Feeds. Minerals. Phytase.

The study was undertaken to evaluate the efficacy of phytase incorporation in feeds of commercial broilers partially replaced for soybean meal (SBM) and dicalcium phosphate (DCP) with alternative feedstuffs on Hb, serum alkaline phosphatase (ALP) and serum mineral profile in broilers at 3 and 5 weeks of age. The results revealed similar positive trend of effects at both the ages for all the 3 replacements of SBM with sunflower meal (SFM), safflower meal (SAFFM) and sesame cake accompanied by DCP substitution with limestone. There was highly significant increase in blood haemoglobin (Hb) level of phytase supplemented broilers when compared with non-supplemented birds. The serum ALP levels were highly significantly enhanced in all the phytase added groups in comparison with broilers without phytase. Further, phytase feeding had significant positive effect on serum mineral (Ca, P, Cu, Zn, Fe and Mg) levels in broiler chickens as compared to birds without phytase feeding. All the improved values of aforesaid parameters studied were at par with figures from control group.

0304. Pandey, Poonam; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India) Agrawal, Late I S; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India) Pandey, A.K.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Effect of dietary supplementation of kanamycin on growth efficiency of crossbred female calves. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1178–1179 Keywords: Antibiotics. Digestibility. Growth. Rumen. Supplements. Calves.

Crossbred female calves (12) were divided into 2 groups. Both groups were fed on concentrate mixture and green oats, however, ration of group T2 was supplemented with kanamycin 20 ppm/head/day. The average daily body weight gain in groups T1 and T2 were 35.65 ± 21.72 and 398.55 ± 11.81 g/day and feed conversion efficiencies were 9.07 ± 0.25 and 8.45 ± 0.16 respectively. The DM and CP digestibility coefficients were higher in group T2, whereas NDF and ADF digestibility were lower in group T2. Thus, kanamycin as a feed additive, stimulates weight gain and improves feed conversion efficiency in crossbred female calves.

0305. Tiwari, Rupasi; Indian Veterinary Research Institute, Izatnagar (India) Sharma, M.C.; Indian Veterinary Research Institute, Izatnagar (India) Singh, B.P.; Indian Veterinary Research Institute, Izatnagar (India). Animal feeding and management strategies in the commercial dairy farms. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1183–1184 Keywords: Animal feeding. Management. Dairy farms.

The study revealed a very poor calf and heifers feeding and management scenario in the commercial dairies. The shed management and breeding management was also very poor indicating that the commercial dairy owners use the dairy animals as a milking machine and discard the animals as soon as the milk production reduces. Therefore a lot of attention needs to be paid to the feeding and management pattern in the commercial dairies with special emphasis on the calf and heifer feeding and management.

L10 Animal Genetics and Breeding

0306. Sahare, M.G.; Sawaimul, A.D.; Ali, S.Z.; Kolte B.R. (Nagpur Veterinary College, Nagpur (India) Department of Animal Genetic and Breeding). Kidding Percentage and Twinning Ability in Osmanabadi goat in Vidarbha Climatic Condition. *Veterinary World (India)* (Feb 2009) v.2(2) p. 60-61 Keywords: kidding percentage, twinning ability, Osmanbadi Goat , Vidharbha region.

The present study was conducted for the study of kidding percentage and twinning ability in Osmanbadi Goat maintained under farm condition. Kidding percentage and twinning ability was found to be 55.87 % and 10.52 % respectively.

0307. Kumar, Shive; CCS Haryana Agriculture University Hisar, Haryana. (India)Singh, R P; CCS Haryana Agriculture University Hisar, Haryana. (India). Expected and realized response in various traits of broiler dam and sire lines. *Indian Journal of Animal Sciences (India)* . (Oct 2009) v.79(10) p.1066–1068 Keywords: body weight. Broiler chickens. Fathers. Mothers.

A study was conducted on 7672 cockerel and pullet birds of dam line and 3223 cockerel and pullet birds of sire line to know the expected and realized response in various traits of broiler dam and sire lines. The Age at first egg was expected to decrease by–0.20 days and the realized response was found to be similar–0.19 days. The egg number was expected to increase 15.29 eggs and the realized was found to be 11.0 eggs over four generation of selection. The present results pointed out that egg number was improved with negligible decline in egg weight. In most of the broiler traits discrepancies between expected and realized responses were observed in all generations. The possible reason for the discrepancies may be that natural selection might have played its role. Simultaneous selection for several antagonistic traits could minimize selection progress. In over all generation the similar response were observed between expected and realized response for reproductive traits viz. age at first egg and egg number. It means we can judge the egg number and age at first egg through expected response in further generation of commercial broiler dam line.

0308. Thirunavukkarasu, M; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Kathiravan, G; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Factors affecting conception rates in artificially inseminated bovines. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.871–875 Keywords: Bovinae. Artificial insemination. Reproductive performance.

This study was conducted to analyze the factors influencing conception failures in artificially inseminated bovines. Bovines (9000 cattle and 1943 buffaloes) inseminated at different centres were selected at random and considered for the study. The overall conception rate was 34.53% in cows and 25.52% in buffaloes. There was a significant association of the conception rate with different farm sizes and with different land holdings in both cows and buffaloes. Milch animals/heifers less than 3 years of age could achieve a higher conception rate than older animals. There was a significant association of conception rate and age of the animal in both the species. However, the relationship of conception rate with order of lactation, stage of lactation and milk yield was significant in cows alone and not in buffaloes. There was a significant difference between the conception rates observed in both cows and buffaloes with and without reproductive disorders. The conception rate in cows was associated with season, while such association was not seen in buffaloes. As the distance to the AI centre increased, the conception rate achieved had remarkably reduced in both the species of bovines. Doorstep inseminations had rewarded in terms of higher conception rates in both cows and buffaloes.

0309. Verma, N. K.; National Bureau of Animal Genetic Resources, Karnal (India)Dixit, S.P.; National Bureau of Animal Genetic Resources, Karnal (India)Dangi, P. S.; National Bureau of Animal Genetic Resources, Karnal

(India)Aggarwal, R. A. K.; National Bureau of Animal Genetic Resources, Karnal (India)Kumar, Subodh; National Bureau of Animal Genetic Resources, Karnal (India)Joshi, B. K.; National Bureau of Animal Genetic Resources, Karnal (India). Malabari goats: Characterization, management, performance and genetic variability. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.813–818 Keywords: Heterozygotes. Goats. Management. Microsatellites. Performance testing. Genetic variation.

Malabari goats inhabit the Calicut, Kannur, Waynad and Malappuram districts of Kerala, India. They are medium to small size animals having varied coat colour ranging from white to admixtures and black. These goats are reared mainly for meat. Phenotypic and genetic characterization of Malabari goats was carried out by using the information collected from breeding tract of these goats. The measurements on body traits of 323 animals from about 65 flocks were recorded. Information on performance traits, managerial practices were collected by interviewing the goat keepers individually. Blood samples collected at random from unrelated 48 animals from breeding tract were utilised for genetic characterization. The average height at wither, body length, heart girth, paunch girth, face length, measured 41.87, 39.20, 38.93, 38.13, 10.27 cm, respectively, at the weaning age (3 months) whereas in adult animals it measured 68.41, 70.30, 73.17, 75.04, 17.28 respectively. The body weights at 3, 6, 9 and 12 months of age were 5.73, 9.20, 13.27, 20.54 kg, respectively, and that of adult goats were 30.68 and 41.20 in female and male respectively. The animals are kept under semi intensive management. Malabari goats show early maturity and conceive at an age of 8 to 10 months. The male starts breeding at an age of 9–12 months. The breed is having a good prolificacy i.e. 50% twinning, 25% triplets and 5% quadruplets. The milk yield varies from 0.5 to 1.5 litre/day. The microsatellite based genetic analysis indicated the number of alleles varying from 4 to 26 with an overall mean of 0.36. The average observed heterozygosity varied from 0.033 to 0.979 whereas expected heterozygosity ranged from 0.152 to 0.925 with mean of 0.689. The gene diversity varied from 0.153 to 0.927 and allelic richness varied from 3.61 to 20.96. The values of the FIS ranged from 0.028 (ILSTS002) to 0.0.924 (ETH 225). The heterozygotic deficiency observed might be due to the inbreeding caused due to indiscriminate and unplanned mating among the animals and lack of sufficient number of good breeding bucks.

0310. Dandapat, Anjan; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, D; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Ghosh, A K; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Banerjee, Dipak; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Association of leptin gene polymorphism with growth, milk production and reproduction traits in Sahiwal and crossbred cattle. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.892–896 Keywords: Crossbreds. Cattle. Blood proteins. Polymorphism.

The genetic polymorphism in exon 2 of bovine leptin gene in purebred *Bos indicus* (Sahiwal) and crossbred cattle *Bos indicus* × *Bos taurus* (Jersey × HF × Sahiwal) was analyzed by polymerase chain reaction and restriction fragment length polymorphism (PCR-RFLP). A 330 bp fragment enclosing the polymorphic HphI site within the second exon was amplified. The digestion of the PCR product with HphI enzyme revealed 2 alleles, viz. allele A (330 bp) and allele V (310 and 20 bp) in crossbred cattle. Only 1 undigested fragment of 330 bp was found in Sahiwal cattle. The results showed a highly significant association of leptin genotypes with the growth traits, first lactation milk yield, second lactation milk yield, average daily milk yield during first lactation and days in milk in first lactation in crossbred cattle. However, nonsignificant association was observed in reproduction traits. The results demonstrated that the heterozygous cows tended to have a better production performance than the homozygous cows.

0311. Jilani, M H; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Singh, Brijesh; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Sharma, R K; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, Shive; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Comparison of various methods of heritability

estimation in a commercial strain of RIR. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.936–938 Keywords: Heritability. Pure lines. Pullets

The data for present study were collected from the performance record of an elite commercial strain of RIR. Data on 771 pullets, progenies produced in three hatches by mating of 198 dams with 50 sires during 1998–99 were collected and used for comparing the heritability estimates of ASM, 20–WKBW, 40–WKBW, EP and EW obtained from REML, methods using an animal model with those from the conventional method least-square ANOVA (sire, dam and sire+dam component of variance estimation). The conventional (ANOVA) methods, sire+dam component method was superior in efficiency in terms of standard errors than the other 2 methods of heritability estimation for all the traits. It was concluded that comparison of ANOVA and REML method indicated that REML method is superior in efficiency in terms of standard errors of heritability estimates for all the traits except for estimates from sire+dam method for body weights at 20 and 40 week of age. The REML method was superior to ANOVA methods with respect to ratio of error variance to total variance.

0312. Panigrahi, Manjit; Indian Veterinary Research Institute, Izatnagar (India)Kumar, Subodh; Indian Veterinary Research Institute, Izatnagar (India)Dhali, Arindam; Indian Veterinary Research Institute, Izatnagar (India)S M Deb; Indian Veterinary Research Institute, Izatnagar (India)Mitra, Abhijit; Indian Veterinary Research Institute, Izatnagar (India)Sharma, Arjava; Indian Veterinary Research Institute, Izatnagar (India)Chaudhary, Hitu; Indian Veterinary Research Institute, Izatnagar (India)Rajkhowa, Chandan; Indian Veterinary Research Institute, Izatnagar (India). Nucleotide variability in partial insulin like growth factor 1 (IGF-1) gene of mithun. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.939–941 Keywords: Nucleotides. Insulin-like growth factor. Insulin.

A 332 bp fragment of insulin like growth factor 1 (IGFI) gene, which included complete exon 3, was amplified in mithun (*Bos frontalis*). The PCR-RFLP analysis showed the absence of polymorphism in this fragment with respect to Avall restriction enzyme and showed 2 restriction sites which produced 3 fragment of 124 (twin) and 84 bp. Seven single nucleotic variations have been noticed in mithun when compared to cattle. The genomic and deduced amino acid sequence of the wild allele, which was the first report on exon 3 of mithun IGFI, was submitted to GenBank (EF686014).

0313. Parveen, Kaiser; Indira Gandhi Agricultural University, Raipur (India)Singh, Mohan; Indira Gandhi Agricultural University, Raipur (India)Mukherjee, K; Indira Gandhi Agricultural University, Raipur (India)Tiwari, S P; Indira Gandhi Agricultural University, Raipur (India). Body measurements and their association with age in growing Sahiwal animals. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1226-1228 Keywords: Body Measurements. Dairy cattle.

The body length (BL), heart girth (HG), height at withers (HT) and paunch girth (PG) of 262 growing Sahiwal animals were measured for the present investigation. The mean values in respect of BL, HG, HT and PG right from 1 month to 36 months showed a linear increase in all body measurements with advancing age. The age was strongly correlated with all the body measurements under study, with the correlation values falling in the range of 0.98 to 0.99. The correlation amongst the different body measurements varied in the range of 0.96 to 0.99. In growing animals the increase in body length, height, heart girth and paunch girth with each month increase in age were observed as 1.94, 2.96, 2.32 and 2.72 cm respectively. The R² values of the prediction equations for prediction of body measurements for a given age in months ranged from 0.96 to 0.99 indicating very high degree of accuracy of the prediction. All the regression values were highly significant.

0314. Yadav, Dinesh Kumar; National Bureau of Animal Genetic Resources. Karnal (India)Singh, Gurmej; National Bureau of Animal Genetic Resources. Karnal (India)Jain, Anand; National Bureau of Animal Genetic Resources. Karnal (India)Singh, Surendra; National Bureau of Animal Genetic Resources. Karnal (India)Paul, Amrit Kumar; National Bureau of Animal Genetic Resources. Karnal (India). Fitting of growth models and evaluation of Marwari sheep under field conditions. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1242-1244 KEYWORDS: Body weight. Biometry. Growth. Sheep.

A survey on farmers sheep flock was conducted to study the geographical distribution, flock management practices, morphometric characteristics, reproduction and production characteristics and socio-economic utility of the Marwari sheep breed. Comparison of four nonlinear models, viz. Gompertz, Von Bertalanffy, Logistic and Brody, revealed that Gompertz model was the best fit to describe growth of Marwari ewe-lambs from birth to 12 months of age. The predicted body weights by the best fitted model showed that there was consistent increasing trend in the body weights of ewe lambs and that nearly 90% of the sexual maturity weight (two-tooth stage) was attained at 12 months of age. Average adult body weights of 24 rams and 246 ewes were 40.7 ± 1.13 and 30.1 ± 0.28 kg respectively. Chest girth (cm) was 81.71 ± 0.81 in rams and 74.25 ± 0.27 in ewes. It was found that the breed was very large in number and widespread but has been diluted substantially due to out-breeding with the local rams and reduction in distribution area of the breed.

0315. Thirunavukkarasu, M; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Cost of artificial breeding in bovines – an estimation. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1245-1251 Keywords: Progeny. Bovinae. Costs.

A study was conducted to estimate the cost of artificial breeding in bovines using the data (1999–2002) collected from 4 frozen semen production centres, and the randomly selected 15 out of 16 frozen semen distribution centres, 137 Veterinary Hospitals/Departments and 15 Veterinary Subcentres of the Tamil Nadu State Animal Husbandry Department. The average cost per dose of frozen semen straw worked out to be Rs 6.73. The average distribution cost per straw was Rs 8.94. In the overall average annual expenses in the State, the total annual average expense incurred for AI related activities at the AI centres was found to be Rs 12.325 million. There were 2.348 million inseminations done in cattle and 0.317 million inseminations in buffalo during the study period, which together put up to 2.665 million inseminations. With the total annual expenditure towards artificial breeding being Rs 65.373 million, total semen production cost, total distribution cost and total insemination cost were Rs 23.185 million, Rs 29.863 million and Rs 12.325 million, respectively. Accordingly, the expenditure incurred per insemination was calculated to be Rs 22.65, of which Rs 6.73 (30.15%) was towards expenses at semen production station, Rs 11.20 (49.45%) towards distribution and Rs 4.62 (20.40%) at insemination centre.

0316. Pal, Yash; National Research Centre on Equines, Bikaner (India) Legha, R A; National Research Centre on Equines, Bikaner (India) Tandon, S N; National Research Centre on Equines, Bikaner (India). Comparative assessment of seminal characteristics of horse and donkey stallions. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1028–1029 Keywords: Indicator organisms. Asses. Horses. Stallions. Semen.

The study was undertaken to establish the variation in seminal characteristics viz. macroscopic, microscopic and biochemical indices in the horse and donkey stallions if any. Semen was collected from 4 Marwari stallions and 6 French donkey stallions at regular intervals. Fresh semen was subjected to macro-and microscopic examinations, while seminal plasma was used for biochemical estimations. Gel volume, gel free semen volume, total semen volume and pH were not significantly different in both the species. Initial and progressive motility and spermatozoa concentration were observed significantly higher in donkeys than horses. GOT, LDH, total protein and triglycerides were significantly ($P < 0.01$) high in seminal plasma of donkeys as compared to horses. It may be concluded that the variations do exist b

0317. Sharma, R C; National Research Centre on Equines, Bikaner (India) Mehta, S C; National Research Centre on Equines, Bikaner (India) Bansal, R S; National Research Centre on Equines, Bikaner (India) Pathak, K M L; National Research Centre on Equines, Bikaner (India). PCR-RFLP profile of MHC-DRB 3 class II genes in Marwari horses. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1036–1037 Keywords: Horses. Major histocompatibility complex. Genes. PCR.

Blood samples (24) of Marwari horses were collected and the DNA was isolated. The PCR amplification of MHCDRB3 gene was carried out using LA31 and LA32 primers and a fragment of 309 bp was amplified. The RFLP analysis of ELA-DRB3 locus was carried out in the samples. Digestion with restriction enzyme Hin f 1

resolved homozygous allelic status in 10 (2 fragments of 241 and 68 bp) and heterozygous status in 14 Marwari horses (three fragments of 309, 241 and 68 bp). The ELA-DRB3 fragment was also digested with restriction enzymes Hae III and Rsa I that resolved the fragments of 221 and 88 and 170 and 139 bp with Hae III and fragments of 238 and 71 and 190 and 119 bp with Rsa I. Results revealed that RFLP analysis at this locus using above restriction enzymes has the potential to group the animals into different classes, which may be of great significance from diseases resistance or susceptibility point of view.

0318. Kumar, Amit; National Dairy Research Institute, Karnal (India) Gandhi, R S; National Dairy Research Institute, Karnal (India)Haile, Aynalem; National Dairy Research Institute, Karnal (India). Estimation of variance components for milk yield of sahiwal cattle using repeatability animal models. *Indian Journal of Animal Sciences (India)*. (Oct 2009) v.79(10) p.1041–1044 Keywords: Animal models. Mothers. Herds.

Estimates of variance components and genetic parameters for lactation milk yield (LMY) were obtained using single-trait 4 different repeatability animal models based on algorithm of derivative free restricted maximum likelihood (DFREML). These repeatability animal models include; the simple animal model (AM I), animal model with sire×herd interaction effect (AM II), animal model with maternal effect (AM III) and animal model with sire×herd interaction effect and maternal effect (AM IV). The data included 3226 first five lactation records of 1223 cows sired by 45 sires and calved between 1968 and 2006. Using AM I, AM II, AM III and AM IV the direct estimates of heritabilities for lactation milk yield were 0.434, 0.359, 0.357 and 0.315, respectively. Sire×herd interaction explained 8.8% and 8.2% of total variation in LMY using AM II and AM IV, respectively whereas maternal effects explained 7.2% and 4.4% of total variation in LMY using AM III and AM IV, respectively. The results indicated that along with direct genetic effects, both sire by herd interaction effects and maternal effects should be included in a selection programme for lactation milk yield. The impact of interaction effects was more significant and consistent. Although, all the animal models had almost equal efficiency (99%) and accuracy (Log L value) but AM IV helped in proper partitioning of additive genetic variance and prevented the inflation of direct estimate of heritability by keeping almost fixed magnitude of error variance. Cows at Karnal herd had highest LMY (2078.89 kg) whereas cows at Luknow herd had lowest LMY (1441.83 kg).

0319. Jain, Anand; National Bureau of Animal Genetic Resources, Karnal (India)Singh, Gurmej; National Bureau of Animal Genetic Resources, Karnal (India)Yadav, Dinesh Kumar; National Bureau of Animal Genetic Resources, Karnal (India). Chokla-an endangered sheep genetic resource. *Indian Journal of Animal Sciences (India)*. (Oct 2009) v.79(10) p.1071–1072 Keywords: Endangered species. Sheep.

0320. Mandal, Ajoy; Central Institute for Research on Goats, Makhdoom, Mathura (India)Sharma, D K; Central Institute for Research on Goats, Makhdoom, Mathura (India)Singh, S K; Central Institute for Research on Goats, Makhdoom, Mathura (India). Genetic and environmental influences on faecal worm egg counts following natural infection in Barbari goats. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.677-678 Keywords: Goats. Heritability. Genetic variation.

The overall least-squares means for log-transformed faecal egg count (LFEC) and geometric mean of FEC (GFEC, epg) of animals in the Barbari flock were 5.3 ± 0.13 and 102.35 unit eggs/g, respectively, during the study period. The present study also showed that genetic (sire) and environmental factors (viz., year of sampling, sampling month and age of animals) had significant effect on faecal egg count of Barbari goats. The parasitic load of the animals was increased with the increment of age of the animals. The moderate heritability (0.32 ± 0.11) estimates for faecal egg count in this breed suggests the existence of some scope for improving this trait.

0321. Pundir, R K; National Bureau of Animal Genetic Resources, Karnal (India)Katiravan, P; National Bureau of Animal Genetic Resources, Karnal (India)Singh, P K; National Bureau of Animal Genetic Resources, Karnal (India)Manikhandan, V A; National Bureau of Animal Genetic Resources, Karnal (India). Bargur cattle: status,

characteristics and performance. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.681-685
KeywordS: Cattle. Storage. Performance testing.

Bargur, the hill cattle of Tamil Nadu, India is reared mostly inside the forests and is surviving under zero-input conditions. Their home tract is restricted to a narrow geographical area in and around Bargur hills at an elevation of about 1000 m above the MSL. The distinguishing morphological features of these cattle include its typical brown colour with white patches and being compact in size. The average body length, height at withers and heart girth were 99.7 ± 2.0 cm, 108.36 ± 0.8 cm and 139.92 ± 0.9 cm in cows and 109.18 ± 3.2 cm, 117.59 ± 1.5 cm and 152.7 ± 3.2 cm for adult males respectively. Cows are poor milkers and produce about 0.5 to 3.0 litres milk per day after suckling by calf. However, bullocks are famous for their endurance and speed in trotting. Animal are mostly maintained for dung and draft in the breeding tract. In the last three decades, the population of these animals has declined drastically by about 90% (to less than 10,000) due to various reasons. There is a strong and urgent need to make efforts for conservation so that the extinction of this valuable germplasm may be avoided.

0322. Paul, A K; Indian Agricultural Statistics Research Institute, New Delhi (India)Kundu, M G; Indian Agricultural Statistics Research Institute, New Delhi (India)Singh, Surender; Indian Agricultural Statistics Research Institute, New Delhi (India)Singh, Pal; Indian Agricultural Statistics Research Institute, New Delhi (India). Heritability of growth curve parameters of pigs. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.716-719 Keywords: Heritability. Genetic parameters. Swine.

Most of the strategies of breeding plan in animal depend on heritability which is one of the most important genetic parameter. Data from 698 pigs were used to examine the potential usefulness of growth curve parameters as selection criteria for altering the relationship between body weight and age. A logistic growth function was found to be best fitted to model growth through 24 weeks of age. Estimates of asymptotic body weight (K), maximum growth rate (R) and age at point of inflection (t^*) have been obtained by non-linear least squares. Phenotypic and genetic parameters were estimated for the estimated growth curve parameters and for body weights through 24 weeks of age. Half-sib model were used for computing genetic parameters. Heritabilities of estimated growth curve parameters were: K (0.301 ± 0.121), R (0.102 ± 0.070) and t (0.874 ± 0.228).

0323. Das, D N; National Dairy Research Institute, Southern Campus, Bangalore (India)Rao, M K; National Dairy Research Institute, Southern Campus, Bangalore (India)V G Shrihari; National Dairy Research Institute, Southern Campus, Bangalore (India)Reddy, A Obi; National Dairy Research Institute, Southern Campus, Bangalore (India) Murthy, L K; National Dairy Research Institute, Southern Campus, Bangalore (India). Characterization of natural resistance associated macrophage protein (NRAMP1) partial gene in Malnad Gidda cattle. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.720-721 Keywords: Cattle. Population genetics. Genotypes. PCR. Rflp. Macrophages.

Malnad gidda cattle, the dwarf variety cattle inhabiting Mamad region of Karnataka depend on low input system of management and withstand harsh climate and heavy rainfall conditions. Survey depicted that there was no incidence of infectious diseases in these animals. An attempt was made to study the polymorphic pattern of NRAMP1 gene with 951 bp region of exon V to VII through PCR RFLP using Hae III and Alu I restriction enzymes. Hae III restriction enzyme revealed that there was no polymorphism with PCR RFLP pattern. With the use of Alu I restriction enzyme, PCR RFLP pattern showed the presence of polymorphism in respect of NRAMP1 gene with 951 bp (exon V-VII). In this study, genotypes, viz., AA, AB, and BB with a frequency of 0.3, 0.475 and 0.225, respectively were detected. The allelic frequency of A and B alleles were estimated as 0.5375 and 0.4625 respectively. As the frequencies are in H-W equilibrium, it is inferred that there was no selective advantage of either of the alleles in respect of disease resistance.

0324. Mishra, B P; National Bureau of Animal Genetic Resources, Karnal (India)Manishi Mukesh; National Bureau of Animal Genetic Resources, Karnal (India)B Prakash; National Bureau of Animal Genetic Resources,

Karnal (India)Sodhi, Monika; National Bureau of Animal Genetic Resources, Karnal (India)R Kapila; National Bureau of Animal Genetic Resources, Karnal (India)A Kishore; National Bureau of Animal Genetic Resources, Karnal (India)Kataria, R R; National Bureau of Animal Genetic Resources, Karnal (India)Joshi, B K; National Bureau of Animal Genetic Resources, Karnal (India)Bhasin, V; National Bureau of Animal Genetic Resources, Karnal (India)Rasool, T J; National Bureau of Animal Genetic Resources, Karnal (India)Bujarbaruah, K M; National Bureau of Animal Genetic Resources, Karnal (India). Status of milk protein, β -casein variants among Indian milch animals. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.722-725 Keywords: Milk protein. Genetic variation.

The role of A1 and A2 beta casein milk variants and human health is a matter of concern for scientific investigations. The status of A1/A2 beta casein variants in *Bos taurus* cattle breeds from different countries have shown presence of A1 variant in European cattle, which has been linked to range of illness. However, no data on beta casein A1/A2 frequency is available on diverse Indian cattle (*Bos indicus*) breeds. Also no report is available on river buffalo breeds which contribute more than 55% of total milk produced in the country. In this study we report the frequency of beta casein variants among 618 animals of 15 zebu cattle breeds and 231 buffaloes of 8 river buffalo breeds. The beta casein A1/A2 frequency data indicated the predominance of A2 variant (0.987) in zebu cattle breeds while the river buffalo indicated only A2 milk type. The results point towards the origin of A2 variant in *Bos indicus* cattle. This is the first report of A1/A2 milk variant from majority of Indian zebu cattle and riverine buffalo breeds.

0325. Rashia Banu N; National Dairy Research Institute, Karnal (India)Singh, Avtar; National Dairy Research Institute, Karnal (India)Joshi, B K; National Dairy Research Institute, Karnal (India). Genetic and environment factors influencing first and overall lactation milk yield in Karan Fries cattle. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.726-728 Keywords: Genetics. Lactation. Milk yield. Cattle.

Data on 1369 Karan Fries cattle spread over a period of 33 years (1973-2005) were analyzed to study the effect of genetic and non-genetic factors on first lactation and overall lactation 305-day milk yield. The season of calving had highly significant effect ($P < 0.01$) on overall lactation milk yield but not on first lactation milk yield. The least squares means for first and overall lactation 305-day milk yield were 2969 ± 31 kg and 3509 ± 25 kg respectively. The autumn calvers had the highest overall lactation milk yield (3649 ± 48 kg) whereas the summer calvers had lowest overall lactation milk yield (3374 ± 41 kg). Period of calving had highly significant ($P < 0.01$) effect on both the milk yield traits. The performance of the herd for first and overall lactation milk yield over the periods did not exhibit any consistent trend. The parities showed highly significant ($P < 0.01$) effect on 305-day milk yield. The 305-day milk yield peaked at 4th parity and then declined from the 5th parity onwards. The heritability estimate for first lactation milk yield (0.20 ± 0.06) was slightly lower than for overall lactation milk yield (0.21 ± 0.06) was slightly lower than for overall lactation milk yield (0.21 ± 0.04). The repeatability of 305-day lactation milk yield estimated by intraclass correlation method was 0.33 ± 0.01 .

0326. Paulm, A K; Indian Agricultural Statistics Research Institute, New Delhi (India)Kundu, M G; Indian Agricultural Statistics Research Institute, New Delhi (India)Singh, Surender; Indian Agricultural Statistics Research Institute, New Delhi (India)Singh, Pal; Indian Agricultural Statistics Research Institute, New Delhi (India). Some aspects of efficiency of early selection in pigs. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.729-731 Keywords: Selection. Swine. Slaughtering.

Indirect selection at early ages for higher body weights during slaughtering age is always more economic in terms of both money and time as compared to direct selection. In the present study Data from 698 pigs were used to examine the efficiency of early selection for improving body weight during slaughtering age. The selection efficiencies were found to be favorable for selecting animal at the early ages, namely at 7 th and 8 th weeks of ages, for the increased body weight at 20th and 24th weeks of age which are very close to slaughtering age.

0327. Kumar, Ramesh; CCS Haryana Agricultural University, Krishi Vigyan Kendra, Jind (India)Singh, Satbir; CCS Haryana Agricultural University, Krishi Vigyan Kendra, Jind (India)Malik, P K; CCS Haryana Agricultural University, Krishi Vigyan Kendra, Jind (India)B Prakash; CCS Haryana Agricultural University, Krishi Vigyan Kendra, Jind (India). Improvement and conservation of Haryana cows under Gaushala management system. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.732-734 KEYWORDS: Storage. Cattle. Reproductive performance. Heritability.

Haryana cattle is acknowledged as one of the best dual purpose breeds because of its longer productive life with high production and reproduction efficiency but in last one or two decades, the breed is not finding favour of farmers especially in the breeding tract which is attributed to the shift towards buffalo milk and comprehensive mechanized agriculture. Thus, breed necessitates immediate attention of farming communities, breed associations, NGOs and Governmental policies for initiating steps for its conservation, preservation and improvement exploiting advanced scientific knowledge because this breed has the advantage over the buffalo to produce milk and draught bullocks even under the low input system.

0328. Jagtap, D Z; Zonal Agriculture Research Station, Maharashtra (India)Mote, M G; Zonal Agriculture Research Station, Maharashtra (India)Nagare, W K; Zonal Agriculture Research Station, Maharashtra (India)Khutal, B B; Zonal Agriculture Research Station, Maharashtra (India). Body measurements of Dangi cattle in field conditions. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.735-736 KEYWORDS: Age groups. Body measurements. Cattle. Growth rate.

The data of 1000 Dangi cows in field condition of 4 age groups i.e. below 2 years, 2-4 years, 4-6 years and above 6 years pertaining to 11 body measurements were collected from breeding tract of Ahmednagar and Nasik districts. Body measurement of male Dangi calf was significantly higher in height at wither, hip bone, pin bone, point of elbow, at hock, and distance between pin bone, body length, heart girth and tail length than female Dangi calf. Maximum body measurement in respect of HAW, HHB, HPB, HPE, HH, DBPB, RS was observed in 4-6 years age group than rest of 3 age groups in male Dangi calf. Maximum body measurement was observed in all traits under study except TL in above 6 years of age than rest of 3 preceding age group in female Dangi calf.

0329. K Mohan; Karnataka Veterinary and Fisheries Sciences University,Karnataka (India)N B Shridhar; Karnataka Veterinary and Fisheries Sciences University,Karnataka (India)Honnappa, T. G.; Karnataka Veterinary and Fisheries Sciences University,Karnataka (India)Ramachandra, S.G.; Karnataka Veterinary and Fisheries Sciences University,Karnataka (India)G C Nirmala; Karnataka Veterinary and Fisheries Sciences University,Karnataka (India)Jayakumar, K; Karnataka Veterinary and Fisheries Sciences University,Karnataka (India). Induction of lactation in repeat breeding crossbred heifers. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.379-380 KEYWORDS: Lactation. Progesterone. Dexamethasone. Milk production. Heifers.

The present study was carried out to induce lactation with the help of hormones or drugs in repeat breeding dairy heifers. Two groups of heifers (group 1 and 2, n=6) were treated with 0.1 mg/kg of 17 β -estradiol and 0.25 mg/kg of progesterone s.c for 7 consecutive days. Both the groups of animals were administered with dexamethasone (20 mg/day) and metoclopramide (0.1 mg/kg/day) i.m on day 14 to 17. The group 2 heifers received 2 doses of prostaglandin F2 α 0.25 mg i/m 10 days apart before the initiation of hormone therapy. The results revealed that the 90 day milk production in group 2 was higher as compared to the group 1. Induction of lactation in the repeat breeding crossbred heifers with prior estrus synchronization increases milk yield.

0330. Khanvilkar, A.V.; Samant, S. R.; Ambore, B. N. (Krantisinh Nana Patil College of Veterinary Science, Shirval (India)). Reproduction in Camel. Veterinary World (India) (Feb 2009) v.2(2) p.72-73. Keywords: Camel, Desert, Transport, Ecosystem, Rutting, Reproduction, Pregnancy.

The word camel is derived from the Greek word "kremal". Camel is an important component of the desert ecosystem from time immemorial and is recognized as the "Ship of the desert". Humans depend on this

animal not just for meat, milk and hide but also as one of the most important mode of transport in the desert which has increased to 10,30,000 million according to FAO census, which is almost 6-8% of the total camel population of the world. The genus *Camelus* has two species, one humped camel found in Africa, Arabia, Iran, Afghanistan and India and two-humped camel found in Central Asia reaching up to Mongolia and Western part of China. Camels have 70 chromosomes. Camels do not have sweat glands and can tolerate heat up to 49 °C to 50°C during the day time and 30°C during night time.

0331. Kumar, Arun; Project Directorate on Cattle, Meerut (India) Singh, Umesh; Project Directorate on Cattle, Meerut (India)Khanna, A S; Project Directorate on Cattle, Meerut (India)Singh, R P; Project Directorate on Cattle, Meerut (India). Genetic and non genetic variability in selective value of Haryana cows. *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.388–391 KEYWORDS: Calves. Survival. Cows. Production.

Data from the calving records of 660 Haryana cows were utilized to study the overall descriptive statistics for total calves born and survived up to first calving in the milking herd from each cow. Average number of total calves produced, total alive calves, total female calves and total female calves reached at milking age per cow during its life time in the herd were 5.2 ± 0.16 , 4.9 ± 1.5 , 2.38 ± 0.15 and 1.2 ± 0.21 . Cow longevity for this herd was 9.12 years, whereas productive herd life was 5.38 years. Average coefficient of gene replication (CGR) was 0.6 ± 0.11 for this herd and indicated that this value is higher than one time gene replication (0.5). There was an increasing trend for the total calves born with the increase in the first lactation milk yield (FLMY), higher milk producing cows produced more number of calves as compared to low milk producers. This varied from 2.1 ± 0.28 calves produced by low milk producers (550 kg) to 6.8 ± 0.36 calves by high milk producers (1550 kg FLMY). The percentage of cows which left the herd after giving only 1 calf was 21.2, and 11.3%. cows produced 10 or more calves in the herd. Effect of age at first calving was not significant on these traits except total alive calves born. Period of birth and FLMY had highly significant effect on these traits. Per cent distribution of cows indicated that 19.3% cows in the herd could not produce any female calf, 25.3% cows left the herd after producing only 1 female calf. About 50% cows left the herd without giving any replacement heifer, whereas 21.4, 12.9 and 8.7% of cows left only 1, 2 and 3 replacements, respectively.

0332. Mishra, Bina; National Bureau of Animal Genetic Resources, Karnal (India)Tantia, M S; National Bureau of Animal Genetic Resources, Karnal (India)Vijh, R K; National Bureau of Animal Genetic Resources, Karnal (India). Genetic differentiation and structuring of Pugal and Garole sheep. *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.392–398 KEYWORDS: Genetic variation. Sheep. Microsatellites. Population structure.

The microsatellite data analysis of 22 heterologous loci in Pugal and Garole sheep breed found in 2 different geographical regions revealed 122 alleles with 45 alleles as private. 26 alleles of Pugal and 19 alleles of Garole breed were peculiar to the breed. The mean number of alleles were 4.68 and 4.52 with observed heterozygosity values of 0.648 and 0.683, respectively, for the 2 breeds. The FIS values were negative indicating no structuring in the populations. The population differentiation value based on analysis of molecular variance was 10.8% , and the high value can be attributed to large geographical distance between the breeding tracts of the 2 breeds. All the individuals could be assigned to their respective populations based on log likelihood values with 100% accuracy. Bayesian analysis revealed one cluster for Pugal while substructuring existed in Garole breed owing to peculiar nature of breeding tract. The interindividual distances estimated using allele sharing and Nei's standard genetic distance and the Neighbor Joining tree constructed from these distances revealed distinctive grouping of the individual belonging to 2 breeds. The existence of genetic substructures in Garole sheep shall require different conservation strategies as there has been little gene flow among different islets as revealed in the present study.

0333. Mishra, Bina; National Bureau of Animal Genetic Resources, Karnal (India)Tantia, M S; National Bureau of Animal Genetic Resources, Karnal (India)Bharanikumar, S T; National Bureau of Animal Genetic Resources, Karnal (India)Mishra, B P; National Bureau of Animal Genetic Resources, Karnal (India)Vijh, R K; National

Bureau of Animal Genetic Resources, Karnal (India). Genetic relationship among camels of India based on microsatellite data. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.399–405 KEYWORDS: Camels. Dromedaries. Camels. Genetic distance. Microsatellites.

The microsatellite data on 4 breeds of dromedarian camel, viz. Bikaneri, Jaisalmeri, Kutchi and Mewari were analysed using Bactrian camel as an out-group. The genetic distances estimated included the distances based on allele frequency, purely geometric and arithmetic distances as well as genetic distances based on allele size (number of repeats). The genetic distances were utilized for construction of the phylogenetic trees using UPGMA and NJ algorithms. The genetic distances revealed very little differentiation among the 3 camel breeds, viz. Bikaneri, Jaisalmeri and Kutchi. The Mewari breed of camel was distinctive and the differences in allele frequency of this breed with other 3 dromedary breeds was attributed to small population size, inbreeding, drift and decreased gene flow.

0334. Vijh, R K; National Bureau of Animal Genetic Resources, Karnal (India)Kumar, St Bharani; National Bureau of Animal Genetic Resources, Karnal (India)Mishra, Bina; National Bureau of Animal Genetic Resources, Karnal (India)Sood, Sushil; National Bureau of Animal Genetic Resources, Karnal (India)Ratan, Sandeep; National Bureau of Animal Genetic Resources, Karnal (India)Tantia, M S; National Bureau of Animal Genetic Resources, Karnal (India). Physical and genetic attributes of Red Jungle fowl. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.406–410 KEYWORDS: Microsatellites. Genera. Chickens.

The Red Jungle fowl is considered to be a progenitor of modern chicken. It is found in wild in Haryana, Himachal Pradesh, Uttarakhand, Asom, Tripura, Manipur and in isolated pockets of Madhya Pradesh and Andhra Pradesh states of India. The data on 25 microsatellites was generated on Red Jungle fowl. The data revealed a good degree of heterozygosity (0.579) at molecular level. The mean number of alleles per locus was 6.8. The effective number of alleles were 3.9 which pointing towards a large number of alleles to be present at very low frequency. Sixteen of the 25 loci were not in Hardy Weinberg Equilibrium providing information for the existence of population structure. The genetic base of the red jungle fowl maintained in the Pheasantry is sufficiently large as revealed by the tests for genetic bottle neck and heterozygosity values.

0335. Kumar, Ravinder; Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (India)Singh, Rajbir; Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (India). Incidence of repeat breeding in buffaloes under rural conditions. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.442–444 KEYWORDS: Farmers. Field experimentation. Seasons. Water buffaloes. Rural conditions.

Based on 2701 observations of 2160 respondent buffaloes, the overall incidence of repeat breeding was 5.40. The season of calving had significant effect on the incidence of repeat breeding. Incidence was highest (8.22) in autumn and lowest (2.95) in summer. The age of buffaloes in term of parity had not any significant effect on the repeat breeding. However, the incidence of repeat breeding was highest (6.57) among the buffaloes kept by marginal farmers and lowest (4.36) among the buffaloes of large farmer categories. Statistical analysis failed to show any significant effect of farmer categories on this trait. The incidence was almost same in all 3 districts ranging from 5.23 to 5.64. among the buffaloes under rural conditions.

0336. Prasad, J.K.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Saxena, M.S.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Prasad, Shiv; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Singh, G.K.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Comparative efficacy of Escherichia coli lipopolysaccharide, oyster glycogen and enrofloxacin on uterine defense mechanism and fertility in crossbred cows with endometritis. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1111–1115 KEYWORDS: Escherichia coli. Lipopolysaccharides. Cows. Endometritis.

Cows (48) tested positive for endometritis on the basis of appearance of cervical mucus and white side test were randomly divided into 4 groups with 12 cows in each group. In group A, 100 µg of Escherichia coli LPS

once, in group B, 500 mg OG once, in group C, enrofloxacin was infused intrauterine for 3 consecutive days and in group D, 20 ml PBS was infused once which served as control group. Endometrial biopsy was collected at 0 h and 72 h from all the cows for histopathological study. Uterine flushing was collected at estrus prior to infusion of drug (0 h) and at 24, 48 and 72 h post treatment for evaluation of changes in total protein concentration, TLC, PMNs%, and the total immunoglobulin concentration. The E. coli LPS and OG treatment significantly increased ($P < 0.05$ or $P < 0.01$) the total protein concentration, TLC, PMNs% and the concentration of total immunoglobulin at 24, 48 and 72 h post treatment. However, intrauterine enrofloxacin therapy reduced ($P < 0.01$) the total protein concentration and PMNs% at 72 h post treatment than pretreatment levels. It is concluded that E. coli LPS and OG may show better therapeutic efficacy to stimulate non-specific uterine defense mechanisms in crossbred cows suffering from endometritis. Further, E. coli LPS and OG may show better therapeutic efficacy than intrauterine enrofloxacin in curing the endometritis in crossbred cows.

0337. Kumar, Amit; National Dairy Research Institute, Karnal (India) Gandhi, R.S.; National Dairy Research Institute, Karnal (India). Effect of sire and herd interaction on milk production in Sahiwal cattle. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1139–1142 KEYWORDS: Animal models. Fathers. Herds. Milk production. Breeding value.

First lactation records (903) of Sahiwal cows, sired by 46 sires of same breed maintained at 3 different farms were analyzed using sire model of best linear unbiased predictions (BLUP) and 2 different animal models based on derivative free restricted maximum likelihood (DFREML) algorithm. The animal model with sire \times herd (S \times H) interaction as additional random effect was found to be the best in terms of efficiency and accuracy over other two models. The animal model with interaction explained 15.2% of total phenotypic variation of milk yield due to sire \times herd interaction and the estimate of heritability for milk yield was highest (0.182). The herd specific breeding values of sires estimated from interaction model ranged from –441.60 kg to 401.39 kg. The genetic slippage was noticed in most of the sires due to differences in managerial practices followed at different farms. The Karnal herd had highest breeding worth whereas lowest breeding worth was for Lucknow herd. The pooled breeding value over herds showed a declining trend over periods.

0338. Sorathiya, L.M.; Navsari Agricultural University. Gujarat (India)Fulsoundar, A.B.; Navsari Agricultural University. Gujarat (India)Kharadi, V.B.; Navsari Agricultural University. Gujarat (India). Environmental and genetic effects on body weight in Surti buffalo calves. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1176–1177 KEYWORDS: Birth weight. Seasons. Sex. Fathers.

The data pertaining to birth dates, birth weights and weights at 3, 6 and 12 months age of 317 buffalo calves were collected from records of Livestock Research Station, Navsari from year 2003–2007. Effects of season of calving were found significant on birth weight, BW3 and BW12. The male calves showed higher weight at all age groups but statistically the effect of sex of calves was only found significant at BW3. Effects of sire were significant for BW6 and BW12. Effects of parity were nonsignificant for birth weight but found significant for BW6. The AFC was significantly and negatively correlated with body weights at 3 months but it was nonsignificant with either birth weights or weights at 6 or 12 months. The birth weight were significantly and positively correlated with BW3, BW6 and BW12 suggesting that body weights at early age can be a fairly good indicator of body weight in subsequent period. The sex ratio (male:female calves) during the period of study was 1.22:1. The frequency distribution of calving was maximum during the S3–rainy season (53.94%) and minimum during S2– summer (17.35%).

L20 Animal ecology

0339. Mondal, S K; National Research Centre on Mithun, Nagaland (India)Borah, I P; National Research Centre on Mithun, Nagaland (India)Dutt, Triveni; National Research Centre on Mithun, Nagaland (India)Rajkhowa, C; National Research Centre on Mithun, Nagaland (India). Maintenance behavioural activities in mithun. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.740-742 KEYWORDS: Behaviour. Rumination. Bovinae.

To document the pattern of as well as to quantify various activities involved in the maintenance behaviour of mithun, 23 adult mithuns of either sexes were used for this study. The results revealed that the mithuns had a combination of grazing and browsing and most of the maintenance activities associated with ingestive, eliminative and altruistic behaviour were found to be similar with those of cattle and buffaloes. The average grazing time was found to be 307.09 ± 21.02 min, while the time taken for eating 1 kg concentrate mixture had a mean value of 9.06 ± 1.28 min. The 12 h rumination time was recorded to be 110.69 ± 9.59 min, while the drinking time was 5.12 ± 0.31 min. The average daily frequencies of urination and defaecation were shown to be 7.33 ± 0.54 and 6.52 ± 0.45 , respectively. This study may help in outlining the proper husbandry practices for mithun in the years to come, keeping the behavioural aspects in view.

0340. Vijayakumar, P; Indian Veterinary Research Institute, Izatnagar (India) Pandey, H N; Indian Veterinary Research Institute, Izatnagar (India) Singh, Mukesh; Indian Veterinary Research Institute, Izatnagar (India) Dutt, Triveni; Indian Veterinary Research Institute, Izatnagar (India) Tomar, A K S; Indian Veterinary Research Institute, Izatnagar (India). Behavioural response to heat ameliorative measures on buffalo heifers. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.433-436 KEYWORDS: Water buffaloes. Heifers. Heat stress. Heat. Behaviour.

The present investigations were made to study the effect of heat ameliorative measures on the behavioural responses of buffalo heifers. Murrah buffalo heifers (18) between 15 and 30 months of age were divided into 3 equal groups based on body weight, viz. T1, control; T2, provided with only fan; and T3, provided with fan and sprinkling for 10 min at 2h intervals. Animals in T3 groups spent more time on rumination (35.24%) followed by T2 (31.04%) and T1 (30.23%). Similarly, animals in T2 group spent 28.75% of their time on feeding followed by T3 (26.35%) and T1 (22.04%) over a period of 24 h. Among the major behavioural patterns and postural parameters, only moving time showed significant difference among the groups. Also, watering and eliminative behaviours, viz. defecation and urination varied significantly among the groups. Among the various combined behavioural activities only standing feeding during night showed significant difference among the groups. In sitting posture, the impact of thermal stress on rumination during 24 h period differed significantly. The results from the present study indicated that only certain maintenance behavioural parameters differed significantly by provision of heat ameliorative measure on buffalo heifers.

0341. P Vijayakumar; Indian Veterinary Research Institute, Izatnagar (India) Pandey, H N; Indian Veterinary Research Institute, Izatnagar (India) Singh, Mukesh; Indian Veterinary Research Institute, Izatnagar (India) Dutt, Triveni; Indian Veterinary Research Institute, Izatnagar (India). Effect of heat ameliorative measures on the growth and physiological response of buffalo heifers during summer. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.437-441 KEYWORDS: Water buffaloes. Heifers. Heat stress. Growth.

The present investigations were conducted to study the effect of sprinkling and fan on the growth and physiological response of buffalo heifers during summer (June 2004 to September 2004). Murrah buffalo heifers (18) between 15 and 30 months of age were divided into 3 equal groups based on age and body weight, viz. T1, control; T2, provided with only fan; and T3, provided with fan and sprinkling for 10 min at 2h interval. The average weight gain during the experimental period was highest in the T3 (61.67 kg) followed by T2 (56.67 kg) and T1 (54.17 kg). The average daily gain was maximum in T3 (501.36 g/day) followed by T2 (460.71g/day) and was least in T1 (440.38g/day). The difference in the rectal temperature between morning (9 AM) and afternoon (2 PM) of control group was significantly higher (0.34°C) than T2 (0.22°C) and T3 (0.13°C). The difference in pulse rate from morning to afternoon was also significant in T1 (2.61 beats/min) when compared to T2 (2.29 beats/min) and T3 (1.31 beats/min). Similarly, the difference in the rate of respiration between morning and afternoon periods was significantly higher in T1 (4.48 counts/min) when compared to T2 (2.28 counts/min) and T3 (1.06 counts/min). Results indicated that provision of sprinkling and fan provided favourable macro-and micro-environment to the animals.

L40 Animal Structure

0342. Hemant Kumar; Sharma, A.K.; Dass, L.L. Anand, Abhishek (College of Veterinary Sciences and Animal Husbandary, Ranchi (India) Dept. of Veterinary Surgery & Radiology). Atresia ani with scrotal anomaly in a Goat. *Veterinary World (India)* (Feb 2009) v.2(2) p. 68

Prominent scrotal raphae was noticed surprisingly as a scrotal anomaly in the present case which might be responsible for lowering the reproductive status of the kid by the time it attains sexual maturity. Catheterization was done with a motto to relieve the pressure of the distended urinary bladder, which in turn facilitated easy expulsion of muconium by reducing undue pressure in the terminal portion of the colon.

0343. Verma, Deepanjali; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Uppal, Variander; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Histogenesis of filiform papillae in buffalo during prenatal life. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.791-793
KEYWORDS: Tongue. Photography. Water buffaloes.

The present study was conducted on the tongue of 36 buffalo foetii (approximate age ranging from 34 days to 298 days). Based on the CVR length, the foetii were divided into 3 groups—group 1: foetii between 0–20 cm CVR; group 2: foetii between 20–40 cm CVR; and group 3: foetii above 40 cm CVR. The paraffin sections were stained with hematoxylin and eosin, Masson's trichrome, Gridley's, Verhoeff's and with Holme's method. The first indication of formation of filiform papillae was observed at 45.0 cm CVR length (175 days). The first evidence of keratinization had also begun at 45.0 cm CVR length with the appearance of keratohyaline granules in the epithelial cells over the developing papillae. The epithelium enveloping the spine of papillae on the anterior aspects contained the soft keratin producing cells and the epithelium covering the posterior aspect contained the hard keratin producing cells. The connective tissue core of the developing filiform papillae contained fibroblast, some mesenchymal cells, fine collagen fibers, few reticular fibers and blood vessels. During the later stages of group 3, the shape of lingual papillae changed significantly from rounded head to pointed.

0344. Manjinder Kaur; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Uppal, Varinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) . Gross morphological and biometrical studies on the testes of buffalo fetus. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.796–797
Keywords: Water buffaloes. Foetus. Biometry. Testes.

The present study was conducted to study gross morphological and biometrical studies on the testes of 18 buffalo fetuses ageing from 8.0 cm to 90.0 cm CVR (65 to 277 days). The right testis was longer, broader, thicker, heavier and had more volume than that of left testis. There was a significant increase in all the biometrical parameters with the advancement of age of the fetus and no significant difference was recorded in the left and right testes. The shape of both the testes varied from rounded in group 1 to oval in group 2 and elongated in group 3. Both the testicles were attached to the latero-ventral aspect of the kidneys and were intra-abdominal at the age of 8.0 cm CVR (65 days). These started migrating into the inguinal region at 18.2 cm CVR (110 days) and descended into the scrotal sac by 75.0 cm CVR (243 days) of buffalo fetus.

0345. Sethi, R. S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Singh, Opinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Morphogenesis and cytodifferentiation of the Wulzen's cone during prenatal development of pars distalis adenohypophysis of buffalo. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.798–799
Keywords: water buffaloes. Foetus. Morphogenesis.

Buffalo fetuses (19) ranging from 30 mm to 630 mm crown–rump length (CRL) were subjected to serial histological sections to study the morphogenesis of the Wulzen's cone. The cone of Wulzen started as thickening of the caudal wall of the Rathke's pouch at 32 mm stage. At 35 mm CRL it was having lumen and was projected towards the infundibulum and appeared as bulb shaped structure at 60 mm CRL. The acidophils, basophils and chromophobes were differentiated at 320 mm CRL stage. The acidophils were small in size as compared to the acidophils of pars distalis, however, other cells resembled their counterparts in pars distalis.

0346. Singh, Opinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Sethi, R S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) P Jagapathi Rammaya; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) . Histomorphological study on trachea of buffalo during prenatal development. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.803–805 Keywords: Trachea. Water buffaloes. Foetus.

The prenatal development of trachea was investigated in fetuses ranging from 2.5 cm to 44 cm crown rump length (CRL). At 2.5 cm CRL trachea appeared as tubular structure lined by stratified basophilic epithelium. At 5.5 to 6.0 cm CRL cartilage buds started developing from surrounding mesenchyme. A single cartilage plate and a smooth muscle band were observed on dorsal aspect of developing trachea at 12.5 cm CRL. All the layers of tracheal wall were differentiated at 15.8 cm CRL with a complete ring of U shaped cartilage. The tracheal glands were observed at 29.0 cm CRL and epithelium transformed to stratified columnar ciliated at this stage in group 2. At 44.0 cm CRL pseudo stratified columnar ciliated type of epithelium was observed in tracheal wall.

0347. Uppal, Varinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Pathak, Devendra; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Ashwani Kumar; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Histomorphochemical studies on the epididymis of guinea pig. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.806–808 Keywords: Testes. Guinea pigs.

The present study was conducted on epididymis of 4 guinea pigs of 3-4 months. The paraffin section of 5-7 µm thickness were stained with hematoxylin and eosin, periodic acid Schiff, alcian blue and bromphenol blue. The study revealed that the epididymis of guinea pig can be divided into seven segments. The epithelial height decreased from segment I to VII whereas the tubular diameter was increased. The main cell types were principal and basal cells. Stereocilia were more pronounced in segments I to IV. Apical cells were found in segment IV and V. Cytoplasmic blebbing, indicative of apocrine secretion was observed in segment V. The peritubular smooth muscle cuff was thickest in segment VII. The basement membrane was strongly positive for PAS whereas the stereocilia were strongly positive for alcian blue. The epithelium was also moderate to strongly positive for basic proteins.

0348. Ramayya, P. Jagapathi; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Singh, Opinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Roy, K S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Histogenesis and degeneration of Hassall's corpuscles in thymus of buffalo. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.880–882 Keywords: Water buffaloes. Biologists. Thymus gland.

In the present study 38 buffalo fetuses and 18 postnatal buffalo calves (1 week to 3 years age) were used. Histogenesis of Hassall's corpuscles began at 9.2 cm CRL (70 days) in buffalo. At 13.5 cm CRL (90 days) distinct Hassall's corpuscles were noted in thymic medulla. Three different types of corpuscles were noted in the thymus of buffalo, viz. unicellular, multicellular and giant type. The wall of the corpuscles showed epithelial cell, reticular cell, lymphocytes and macrophages. Degeneration of Hassall's corpuscles began at 6 months postnatal life and they disappeared completely by 2 years of age in buffalo.

0349. Roy, K S; Gugu Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Bhatia, H; Gugu Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Pathak, D; Gugu Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Kumar, A; Gugu Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Prenatal development of testis in buffalo: A histomorphological study. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.883–886 Keywords: Water buffaloes. Developmental stages. Foetus. Perinatal period. Testes.

The present study was conducted on 10 prenatal buffalo embryos/foetii of different gestational ages. Indifferent gonad was the first to be observed in buffalo embryo at CRL 3.2 cm (43 days) as a nodular structure attached medial to mesonephros. The sexing of buffalo embryo of indifferent stage was initiated at CRL 4.0 cm (47 days), which was characterized with the formation of tunica albuginea and differentiation of blastema into a testicular cord-like structure. The indifferent gonad of male embryo was finally transformed into testis in 100 cm CRL (300 days) buffalo foetus. Study of semi-thin sections revealed the establishment of 2 main components in the foetal testis. The seminiferous cords consisted of centrally located gonocyte surrounded with foetal sertoli cells. The second derivative of testicular blastema was the interstitial tissue consisted of fibroblast and leydig cells. The gonocyte gradually moved towards the basement membrane of the testicular cord and developed into prespermatogonia.

0350. Sethi, R S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Singh, O; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Rampal, S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Kaur, R; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Sood, N K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Histological alterations in spleen of rabbits induced by ofloxacin. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.890–91 Keywords: bactericides. Spleen. Rabbits.

The present study was planned to evaluate toxic effects of ofloxacin on spleen, if any after prolonged oral administration. Nine rabbits were equally divided in groups 1, 2 and 3. The rabbits of group 1 and 2 were administered ofloxacin 0 mg and 40 mg per animal/day orally, respectively, in 2 equally divided doses at 12 hr intervals for 21 consecutive days whereas, the group 3 animals were given normal saline solution which served as control group. The endothelial cells of the central arteriole showed vacuolated cytoplasm and the vessels particularly capillaries were dilated in group 2 without any cellular infiltration. The large pyrinophilic cells around the central arteriole were observed throughout the white pulp and these cells were more in number in group 2. The clumps of Prussian blue positive granules were more in group 2 indicating an effect of ofloxacin administration on the haematopoiesis probably in terms of increased destruction rate of erythrocytes. It was concluded that prolonged administration of ofloxacin in rabbits may result in damage to normal functioning of spleen.

0351. Kumar, Pawan; CCS Haryana Agricultural University, Hissar (India)Timoney, John F; CCS Haryana Agricultural University, Hissar (India). Light and ultrastructural studies on the ependymal secretion and formation of Reissner's fibre in horses. *Indian Journal of Animal Sciences (India)*. (Dec 2009) v.79(12) p.1209-1211 Keywords: ultrastructure. Fibres. Horses.

The light and electron microscopy was conducted on Reissner's fibre (RF) in 6 young horses of either sex. RF representing cilia, microvilli along with heterogeneous material consisting of RBC and cell debris lay in mid line towards the ventricular surface of the subcommissural organ (SCO) ependyma and cerebral aqueduct. The SEM revealed Reissner's fibre originating from apical spherical protrusions of the SCO. RF of horse presented rough irregular surface due to presence of longitudinal grooves and attachment of RBCs and cell debris. TEM revealed RF as irregular structure cut in different profiles toward the free ventricular surface. Mostly these structures were observed as a single layer. The cytoplasm had smooth and rough endoplasmic reticulum, and a few Golgi complex however, the nucleus and mitochondria were absent.

0352. Monika Suman; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India) Bansal, Neelam; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India) Uppal, Varinder; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India). Histogenesis of fibroarchitecture of buffalo kidney during prenatal life. *Indian Journal of Animal Sciences (India)*. (Dec 2009) v.79(12) p.1224-1225
Keywords: water buffaloes. Fibres. Kidneys.

The differentiation of the connective tissue fibre in the kidney of buffaloes was studied. Buffalo foeti (17) were divided into 3 groups on the basis of curved crown rump length. Collagen, reticular and elastic fibres were studied in 5–7 mm thick tissue samples.

0353. Usha Kumary S.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Venkatesan, S; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Geetha Ramesh; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Microanatomical studies on the caecum of Japanese quail. *Indian Journal of Animal Sciences (India)*. (Oct 2009) v.79(10) p.1011–1014
Keywords: intestines. Quails.

Microanatomical studies on the caecum of Japanese quail were done in different age groups. The villi were present in the mucosa of proximal part of the caecum and their height was more in the attached wall of the mucosa. The middle and the distal parts of the caecum possessed mucosal folds instead of villi. The shape of villi of the proximal part of the caecum was distorted by the underlying caecal tonsils. These caecal tonsils were noticed in the lamina propria of birds of 6 and 8 week age groups but absent in day-old birds. Numerous crypts of Lieberkuhn were seen in the lamina propria of the caecum. The surface epithelium of villi, mucous folds and crypts of Lieberkuhn were lined by the enterocytes along with goblet cells. Goblet cells were more in the proximal part of the caecum. The muscularis mucosa was very thin. Submucosa was narrow at the proximal part and wider at middle and distal part of the caecum. The tunica serosa was more distinct at attached wall.

0354. Pathak, Virender; CSK Himachal Pradesh Krishi Vishwa Vidyalaya, Palampur (India) Sudhakar, L S; CSK Himachal Pradesh Krishi Vishwa Vidyalaya, Palampur (India) Bhardwaj, R L; CSK Himachal Pradesh Krishi Vishwa Vidyalaya, Palampur (India). Histomorphological studies on the pineal gland of Gaddi Goat. *Indian Journal of Animal Sciences (India)*. (Oct 2009) v.79(10) p.1033–1035
Keywords: Goats. Animal morphology

The pineal gland of Gaddi goat was enclosed in a thin capsule composed of collagen and reticular fibers. The parenchyma of the pineal gland consisted of pinealocytes and glial cells. The pinealocytes were arranged in irregular groups, cords or follicles and were distributed more densely at the periphery than at the centre. They had large and round nuclei. Their cytoplasm showed strong reaction for protein. Pineal gland of Gaddi goat showed four types of glial cells. In the interstitial connective tissue of the pineal gland nerve fibers were also observed surrounding the blood capillaries corpora arenacea were observed as large concentric lamellar structures in the central part of the pineal gland.

0355. Perme, Honjon; Indian Veterinary Research Institute, Izatnagar (India) Sharma, A K; Indian Veterinary Research Institute, Izatnagar (India) Kumar, Naveen; Indian Veterinary Research Institute, Izatnagar (India) Singh, Himane; Indian Veterinary Research Institute, Izatnagar (India) Maiti, S K; Indian Veterinary Research Institute, Izatnagar (India) Singh, Rajendra; Indian Veterinary Research Institute, Izatnagar (India). In-vivo biocompatibility evaluation of cross linked cellular and acellular bovine pericardium. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.658-661
KEYWORDS: Bovinae. Pericardium. Histopathology. Rabbits.

Fresh bovine pericardium procured from the local abattoir was cut into 2 cm x 2 cm size pieces and crosslinked with 1% solution of glutaraldehyde (GA), formaldehyde (FA), polyethylene glycol (PEG), hexamethylene diisocyanate (HVIDI) and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide (EDC). Other pieces were made acellular and then crosslinked with above chemical agents. In-vivo biocompatibility of the biomaterials was determined by subcutaneous implantation in rabbits. The implants were retrieved back on day 14, 30 and 90 post-implantation and subjected to macroscopic and microscopic evaluation. The host inflammatory response,

neovascular tissue formation (fibroblasts, fine capillaries), deposition of neocollagen and penetration of host inflammatory responses in the grafted matrix were evaluated.

L50 Animal Physiology and Biochemistry

0356. Ghuman, G S; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India)Singh, D V; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India). Biochemical profiles following flunixin meglumine administration in combination with hypertonic saline during endotoxic shock in buffalo calves. *Indian Journal of Animal Sciences (India)*. (Jul 2009) v.79(7) p.669-672 Keywords: Biochemistry. Water buffaloes. Endotoxins. Flunixin. Meglumine.

Endotoxic shock was produced in 5 apparently healthy male buffalo calves aged between 4 months and 1 year by i/v infusion of *Escherichia coli* endotoxin 5 µg/kg BW/h for 3 h. The animals were further observed for 7 days. A general hypoproteinemia was observed during endotoxin infusion along with significant hypoalbuminemia, hypoglycemia, hypofibrinogenemia, decrease in plasma globulin, creatinine while plasma blood urea nitrogen, sodium, potassium, and chloride showed nonsignificant alterations during endotoxin infusion for 3 h. All the endotoxemic buffalo calves were infused i/v hypertonic saline solution (7.2% NaCl aq.) 4 ml/kg BW in 6.5 min followed by flunixin meglumine 1.1 mg/kg BW as one time infusion and plasma proteins showed a significant decrease at 4h but increased significantly on day 2 while albumin showed a declining trend throughout the observation period with a significant fall at 4h of start of endotoxin infusion. While plasma globulin decreased, plasma fibrin increased significantly on second and third day. Hypoglycemia continued from day 1-6 accompanied by a nonsignificant fall in BUN within normal range throughout the 7 day observation period. The plasma creatinine increased significantly at 5 and 7 h of day 1 and on day 2 of observation. Plasma sodium potassium and chloride did not alter significantly indicating that this treatment combination does not greatly affect the biochemical profiles during bovine endotoxemia.

0357. G Krishnan; National Research Centre on Yak, Arunachal Pradesh (India)Ramesha, K.P.; National Research Centre on Yak, Arunachal Pradesh (India)Chakravarty, P; National Research Centre on Yak, Arunachal Pradesh (India)Chouhan, V.S.; National Research Centre on Yak, Arunachal Pradesh (India)Jayakumar, S.; National Research Centre on Yak, Arunachal Pradesh (India). Diurnal variation in the physiological responses of yaks. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1132-1133 Keywords: body temperature. Diuron. Respiration rate.

The present study was carried out at National Research Centre on Yak. Healthy yaks (30) were divided into 3 groups, viz. calves, adult bulls and lactating yak cows. They were maintained under semi range system of management. The primary physiological responses were recorded at 4h intervals at alternate months throughout the year in all the 3 groups of yak. The physiological responses were minimum in the early morning and maximum during late afternoon. The physiological responses of calves were significantly (P<0.05) higher than adult bulls and lactating yak cows during late afternoon. In all the three groups of yak the physiological responses were significantly higher (P<0.05) during summer than winter.

0358. Singh, Gyanendra; Indian Veterinary Research Institute, Izatnagar (India)Hooda, O.K.; Indian Veterinary Research Institute, Izatnagar (India)Mahapatra, R.K.; Indian Veterinary Research Institute, Izatnagar (India)Meur, S.K.; Indian Veterinary Research Institute, Izatnagar (India)Varshney, V.P.; Indian Veterinary Research Institute, Izatnagar (India). Ameliorative effect of zinc and manganese supplementation in buffalo calves during hot climatic conditions. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1153-1155 Keywords: water buffaloes. Heat stress. Zinc.

Ameliorative effect of zinc and manganese on buffaloes was studied during natural hot summer climate. Buffalo calves (18) of either sex in age group of 6-7 months were divided in groups A, B and C of 6 each. Group A was supplemented with zinc sulphate 00 mg/ animal/ day, group B was supplemented with zinc sulphate 00

mg/ animal/ day plus MnCl₂ 00 mg/ animal/day daily during the experimental period, while group C was kept as control. Respiration rate, pulse rate and rectal temperature increased significantly from morning to evening, while animals of zinc sulphate supplemented group had significantly lower respiration rate in the evening compared to other groups. The activity of alkaline phosphatase and concentration of glucose, cholesterol, triglyceride, calcium, magnesium, potassium, triiodothyronine (T₃) and thyroxine (T₄) did not vary significantly different among groups. However, in zinc sulphate supplemented group, the concentration of blood urea and aspartate aminotransferase decreased significantly compared to control and zinc sulphate plus manganese chloride supplemented group. The significantly higher plasma sodium concentration was observed in zinc sulphate and zinc sulphate plus manganese chloride supplemented group compared to control group. Our results indicated that supplementation of zinc sulphate during hot summer may ameliorate some effect of heat stress in buffalo calves.

0359. Reddy, I J; National Institute of Animal Nutrition and Physiology, Bengaluru (India)Ravi Kiran, G; National Institute of Animal Nutrition and Physiology, Bengaluru (India)Mondal, S; National Institute of Animal Nutrition and Physiology, Bengaluru (India)S Anandan; National Institute of Animal Nutrition and Physiology, Bengaluru (India). Pulsatile secretion of luteinizing hormone and its relation to pause days and egg production in dual purpose hens treated with antiprolactin agent. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.988–991 Keywords: egg production. Hormones. Secretion.

Objective of this study is to investigate the amplitude and frequency of luteinizing hormone (LH), in backyard birds treated with antiprolactin agent and its effects on plasma prolactin (PRL), LH, estradiol, progesterone , intersequence pause days and egg production. Birds were divided in 2 groups (control and treated) of 12 birds each. Birds in treated group were administered s/c with anti PRL agent solution containing 00 mg/kg body weight/hen/week (treated group) from 72 to 82 weeks of age. And controls were placebo. Inter sequence days and egg productions were recorded daily from both the groups. Plasma PRL concentration was lower in bromocriptine treated birds with high concentrations of LH, its 3 h LH surges, E₂ and P₄ in plasma. Treated birds showed higher egg production, less pause days with concomitant increase in plasma concentration of LH, its amplitude and frequency, besides steroid hormones required for egg formation and oviposition. It is hypothesized that control of PRL secretion with antiprolactin agent, caused enhanced steroid hormone profile; and LH surges required for egg formation and egg lay with lower incidence of pause days in backyard birds enabled the birds to lay more eggs even later in the productive period with under normal husbandry conditions.

L51 Animal physiology – Nutrition

0360. Sharma, M C; Indian Veterinary Research Institute, Izatnagar (India)Joshi, Chinmay; Indian Veterinary Research Institute, Izatnagar (India)Das, Gunjan; Indian Veterinary Research Institute, Izatnagar (India). Soil, fodder and serum mineral (cattle) and haematobiochemical profile in some districts of Central Uttar Pradesh . Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.411–415 Keywords: cattle. Hormones. Retinol. Vitamin e.

To record the mineral, hormone and vitamin status in cattle of some districts of Central Uttar Pradesh a survey was conducted. It was observed, that the macro minerals mainly calcium (Ca), magnesium (Mg) and phosphorus (P) were deficient and well below the critical level, along with significant deficiency in micro minerals, viz. copper (Cu) and zinc (Zn). The soil-fodder and serum status of all these districts was significantly co-related at 1% and 5% level. Significant decrease was observed in haemoglobin (Hb), and total erythrocyte count (TEC) while total leukocyte count (TLC) was slightly higher in deficient cattle. The values of serum enzymes, viz. aspartate transaminase (AST) and, alanine transaminase (ALT) were lower whereas serum alkaline phosphatase (SAP) was higher. The values of thyroid hormones (T₃ and T₄) and vitamins (A and E) were significantly lower in deficient animals.

0361. Tiwary, M K; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Tiwari, D P; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Mondal, B C; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Kumar, Anil K; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Minerals relationship among soil, plants and animals in Haridwar district of Uttarakhand. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.451–453
Keywords: water buffaloes. Cattle. Plants. Soil.

Samples of soil, feeds and fodder and blood serum of animals in 4 villages of Uttarakhand were collected and analysed for different macro- and micro-mineral contents and also established the correlations among soil, plants and animals. The macro- and micro-mineral contents in the soil in Haridwar district were not deficient. The daily average macro- and micro-mineral intake in animals through different feed ingredients were optimum except copper. The total mineral intake showed nonsignificant positive correlations for calcium, phosphorus and zinc while negative correlations for magnesium and iron. The total copper and manganese intakes had significant ($P < 0.05$) positive correlations with blood serum. The dietary supplementation of phosphorus, copper and magnesium in the form of area specific mineral mixture in plain region of Uttarakhand is inevitable.

0362. Thirumalesh, T.; Krishnamoorthy, U (Karnataka Veterinary, Animal and Fisheries Sciences University, Bangalore (India). Department of Livestock Production and Management) Effect of Feeding Diets Differing in Partitioning Factor on Intake, Digestibility and Nitrogen Metabolism in Ram Lambs. Animal Nutrition and Feed Technology (India) (Jan 2009) v.9 (1) p 11-21

This study was conducted to determine effect of diets differing in partitioning factor (PF) on feed intake, N metabolism and urinary purine derivative excretion (PDe) in 12 bannur ram lambs (Body weight: 15.7 ± 0.57 kg) in a 4×4 Latin Square Design (LSD) experiment. The diet consisted of Rhodes grass (*Chloris gayana*) hay as the sole forage and compound feed mixtures, with a concentrate to roughage ratio of 50:50, to provide metabolizable energy and other nutrients for maintenance, plus a weight gain of 50 g/d/ram. The concentrate supplements were formulated using tabulated PF data to differ in PF in order to create diets with PF values that increased linearly from 3.0 to 3.5. The feeding study lasted for 16 weeks in 4 periods of 4 weeks with collection period of 7 days. Measured PF values ranged from 3.07 to 3.59, but k values were similar among the diets (i.e., 0.0496 to 0.0525/h). Intake of NDF and ADF was lowest ($P = 0.05$ or less) for the lowest PF diet, and digestibility of DM and OM decreased ($P < 0.01$) as the diet PF increased. Digestion of NDF and ADF was lower ($P = 0.05$ or less) as the PF of the diet increased. There were no differences among diets in purine derivative excretion in urine or estimated microbial N supply to the duodenum. Results appear to suggest that feeding of diets differing in PF to a much greater extent than k had no impact on measured microbial N flow to the duodenum

0363. Verma, A.K.; Singh, P.; Deshpande, K.Y.; Verma, Vinay; Mehra, U.R. (Center of Advanced Studies in Animal Nutrition, Indian Veterinary Research Institute, Izatnagar (India)). Influence of Dietary Protein Levels on Nutrient Utilization and Blood Parameters in Buffaloes. Animal Nutrition and Feed Technology (India) (Jan 2009) v. 9(1) p 21-28
Keywords: Water Buffaloes, Protein intake, Blood profile, Nutrient utilization.

Thirty growing bulls (Murrah, 1 year age, 80.3 ± 1.95 kg b.wt.), divided into three equal groups following completely randomized design, were fed on isocaloric (2.01 ME Mcal/kg diet) diets containing standard protein ration at 100 (SP), 90 (MP), and (80) LP percent of requirements as per Kearnl, respectively. After 21 days of feeding, a metabolic trial of 6 days duration was conducted on 6 animals of each group. Intake and digestibility of CP and DCP intake (g/kgW^{0.75}) varied significantly ($P < 0.05$) among groups, being lowest in group 3. Intake of DM and OM (g/kgW^{0.75}) was also similar in groups 1 and 2 but significantly ($P < 0.05$) higher than in group 3. Nutrient digestibility other than CP did not vary among the groups. Intake and balance of N (g/d) were significantly ($P < 0.05$) higher in group 1 than in groups 3 however variation between group 1 and 2 was not significant. N balance as percent of intake as well as absorbed did not differ significantly among 3 groups.

Intake and balance of Ca and P balance were higher ($P<0.05$) in group 2 than in other groups. The blood biochemical profiles were comparable among all groups except for glucose and globulin (mg/dl), which were higher ($P<0.05$) in group 1 than in groups 2 and 3. It may be deduced that feeding of animals up to 90 percent of Kearn's standard protein requirements had no adverse effect on nutrient utilization and blood profile.

0364. Ghosh, M.K.; Atreja, P.; Bandyopadhyay, S. (National Dairy Research Institute, Karnal (India). Division of Dairy Cattle Division). Biodegradation of Mimosine and 3-hydroxy-4 (1H) Pyridone in Karan Fries Crossbred (Holstein Friesian \times Tharparkar) Cattle. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v. 9(1) p 65-72
Keywords: Leucaena leaf meal, Mimosine, Thyroid, Liver, Cattle.

Three rumen fistulated Karan Fries crossbred (Holstein Friesian \times Tharparkar) calves were fed increasing dry matter (DM) levels of 25, 50, 75 and 100% through leucaena leaf meal (LLM) starting in week 1, 2, 3, and 6, respectively. The mimosine, 3, 4 DHP and 2, 3 DHP levels were determined in strained rumen liquor (SRL) at 0, 2, 4, 8, 12 and 24 h post feeding on days 1, 8, 15, 22 and 42 and in serum samples at 0, 4, 8h post feeding on days 1, 8, 15, 22 and 45. LLM was incubated for 24 h with SRL in vitro on days 0, 7, 14, 21, 42 and 98 to study mimosine and dihydroxy pyridone (DHP) biodegradation. DM intake was 2.29, 2.14, 1.83, 1.51, 1.46 and 0.71% of live weight through 1st to 6th weeks, respectively. Both in vitro and in vivo studies showed degradation of mimosine to 3, 4 DHP and 2, 3 DHP from 1st day of LLM feeding, but from 2, 3 DHP to further degradation to nontoxic compound was limited. The overall in vitro DHP degradation was 33.11, 48.65, 39.37, 57.93 and 31.94% on day zero, 7th, 14th, 21st and 42nd of LLM feeding. The appearance of mimosine, 3, 4 DHP and 2, 3 DHP in blood indicated their absorption from gastrointestinal tract. The faecal and urinary excretion of mimosine, 3, 4 DHP and 2, 3 DHP as per cent of mimosine intake declined from first week (40.09 ± 1.63) to 6th week (27.44 ± 2.22).

0365. Roy, R.K.; Shrivastava, H.P.; Deo, C.; Sastry, K.V.H.; Mandal, A.B. (Central Avian Research Institute, Izatnagar (India). Avian Nutrition and Feed Technology Division) Effect of Feeding Fenvalerate on Haematobiochemicals in Broilers. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v. 9(1) p 91-96
Keywords: Broiler chickens, Fenvalerate, Haematobiochemicals.

A 42-days feeding trial was conducted to study the effect of fenvalerate (FEN) on certain haematobiochemicals in broiler chicks. Day-old straight run chicks ($n=180$) of same strain were randomly distributed to 5 experimental groups, each comprising 3 replicates of 12 chicks. Different levels of FEN at 0, 30, 60, 90 and 120 ppm were added in starter (0-21d) and finisher (22-42 d) basal diets. At the end of starter and finisher phases, the blood samples were collected randomly from 2 birds per replicate viz. 6 birds per treatment, centrifuged for serum separation and analysed for certain haematobiochemicals. Alkaline phosphatase, aspartate aminotransferase, glucose and total protein increased significantly ($P<0.01$) in broilers fed diets containing 30 to 120 ppm FEN as compared to untreated basal diet during both the phases, while acid phosphatase, alanine aminotransferase and uric acid increased significantly ($P<0.01$) during starter phase but not during finisher phase. Total cholesterol was significantly higher ($P<0.01$) during the finisher phase. The study indicated that the fenvalerate when added in broiler diets caused disturbances in homeostasis of major blood biochemicals.

L52 Animal physiology - Growth and development

0366. Bhakat, Champak; National Research Centre on Camel, Bikaner (India) Saini, Nirmala; National Research Centre on Camel, Bikaner (India) Pathak, K M L; National Research Centre on Camel, Bikaner (India). Growth characteristics, economics and hair mineral status of camel calves reared in different systems of management. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.932-935
Keywords: Camels. Economics. Farmers. Growth. Hair. Management. Minerals.

Management systems were compared by conducting 2 trials with different feeding practices. Trials 1 and 2 were conducted by feeding guar phalgati and moth chara as manger feeding, respectively, for 165 days each to 5 camel calves each under intensive system of management (ISM) and semi-intensive system of management (SIM). Total gain in body weight was higher in SIM than ISM group in both the trials. Mean body weight and average growth rate significantly increased in SIM as compared to ISM group at the end of both the trials. The mean moth chara intake was significantly ($P<0.05$) more in ISM than SIM. The important hair minerals (calcium, magnesium, copper, zinc, iron and manganese) increased significantly in SIM as compared to ISM group. The manganese status varied significantly ($P<0.05$) between groups in moth chara trial. Feeding cost/calf/day and total cost were high in ISM than SIM group in both the trials. Total cost/kg body weight gain was quite less and economical in SIM as compared to ISM group. The study indicated SIM better than ISM for economic rearing of camel calf.

0367. Singh, R.K.; Indian Veterinary Research Institute, Izatnagar, (India)Das, B.C.; Indian Veterinary Research Institute, Izatnagar, (India)Majumdar, A.C.; Indian Veterinary Research Institute, Izatnagar, (India)Bag, Sadhan. Simulation of body temperature and different gaseous phase on in vitro maturation and embryo development in goat. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1103–1106 Keywords: Body temperature. In vitro. Maturation. Embryonic development. Goats. Gases.

The present study was carried out to study the effect of different simulation of body temperature during in vitro culture along with different gaseous phase on in vitro oocyte maturation, fertilization and embryo development in goat. Goat oocytes were aspirated from ovaries collected from a local slaughterhouse. The oocytes were matured in TCM-199 with HEPES, 10% FBS, 10% follicular fluid, 0.5 µg/ml FSH, 10 IU/ml LH, 0.5 µg/ml estradiol for 27h. The mature oocytes were fertilized with freshly ejaculated sperm in TALP media and cultured in mSOF media without any cell supplementation. The in vitro maturation, fertilization and culture (IVMFC) were done at different gas phases (5% CO₂- 20% O₂; 5% CO₂ - 10% O₂; 7.5 CO₂ - 20% O₂; 7.5% CO₂, - 10% O₂) at 38.5°C in CO₂ incubator with maximum humidity. The study indicated that comparatively better maturation rate., cleavage rate, development of 4–8 cell and morula stage embryos were observed at 39.5°C irrespective of gas phase. Similarly, the better maturation rate was observed in 5% CO₂ and 10% O₂, whereas better cleavage rate and morula were observed in 5% CO₂ and 20% as compared to other gas phases.

L53 Animal physiology – Reproduction

0368. Sinha, R R K; Indian Veterinary Research Institute, Izatnagar (India)Dutt, Triveni; Indian Veterinary Research Institute, Izatnagar (India)Bhushan, Bharat; Indian Veterinary Research Institute, Izatnagar (India)Singh, R R; Indian Veterinary Research Institute, Izatnagar (India)Singh, Mukesh; Indian Veterinary Research Institute, Izatnagar (India). Production and reproduction profile of cattle and buffaloes in Bareilly district of Uttar Pradesh. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.786–787 Keywords: water buffaloes. Cattle. Production. Reproductive behaviour.

Status of important production and reproduction parameters in cattle and buffaloes in rural, semi-urban and urban areas was studied to estimate the adoption of recommended practices in dairy farming under village condition. Farmers in urban areas were following more scientific and organized herd management practices compared to farmers of rural and semi-urban areas.

0369. Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Uppal, Varinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Prenatal development of ductus epididymis in buffalo fetuses. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.794–795 Keywords: water buffaloes. Testes. Foetus.

The present study was conducted on the ductus epididymis of 6 buffalo fetuses ranging from 10-18.2 cm CVR (74 days to 110 days of age). There were 16-20 rounded or ovoid efferent ductules which were lined by simple

columnar epithelium with large and elliptical nuclei having prominent nucleoli. At 10.6 cm CVR buffalo fetus each of the epididymal duct was surrounded by 7-8 layers of peritubular mesenchymal cells which later on transformed into smooth muscle cells at 18.2 cm CVR. The ductus epididymis was also lined by simple columnar epithelial cells. Ciliated, non ciliated cells and stereocilia were observed in the ductus epididymis at 18.2 cm CVR. The basement membrane was strongly PAS positive and moderately positive for acid mucopolysaccharides.

0370. Sethi, R. S.; Guru Angand Dev Veterinary and Animal Sciences University, Ludhiana (India) Roy, K S; Guru Angand Dev Veterinary and Animal Sciences University, Ludhiana (India). Cytodifferentiation of foetal cortical cells in adrenal gland of buffalo. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.800-802
Keywords: Adrenal glands. Water buffaloes.

The study was conducted on the adrenal glands of 43 buffalo foetuses ranging from 39 mm (46 days) to 890 mm (274 days) crown rump length (CRL) to investigate the cytodifferentiation of foetal cortical (FC) cells. The true foetal cortex, medulla and undifferentiated cells appeared under the capsule by 109 mm (78 days) CRL stage. The FC cells were small, round to elongated, arranged into cords and separated by the capillaries. They were characterized by having abundant eosinophilic cytoplasm and spherical nuclei in the center. They intermingled with medullary cells at the corticomedullary junction without any distinct line of demarcation between them. The FC cells were better organized with the progression of age, however, isolated groups of FC cells could also be noticed without forming any strands in the medulla. The degenerating FC cells were observed with pyknotic nuclei in the vicinity of blood vessels in the medulla.

0371. Biswas, T. K.; National Research Centre on Yak, ICAR, Dirang (India) Bandyopadhyay, S.; National Research Centre on Yak, ICAR, Dirang (India) Ramesha K.P.; National Research Centre on Yak, ICAR, Dirang (India) Ghosh, M. K.; National Research Centre on Yak, ICAR, Dirang (India) Jayakumar S.; National Research Centre on Yak, ICAR, Dirang (India) G. Krishnan; National Research Centre on Yak, ICAR, Dirang (India). Non-genetic factors affecting birth weight in yak. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.834-835
Keywords: birth weight. Gestation period. Sex. Seasons. Yaks.

Among the components of maternal influence on birth weight, differences attributable to parity, gestation length and body weight of dams were considered highly significant in yaks. Relationship between calves' birth weight and dams' body weight suggested selection of female based on body weight may alter the average birth weight of the herd. Sex of calves, season of birth and the change in nutritional regime over the year were also found to affect the birth weight significantly. On average, male calves were 1.0 kg heavier than the female ones (14.20 vs 13.20). Calves which born in the early autumn season were comparatively lighter than others.

0372. Biswas, T.K.; National Research Centre on Yak, ICAR, Dirang (India) Ramesha K P; National Research Centre on Yak, ICAR, Dirang (India) Bandyopadhyay, S; National Research Centre on Yak, ICAR, Dirang (India) Ghosh, M K; National Research Centre on Yak, ICAR, Dirang (India) Jayakumar S; National Research Centre on Yak, ICAR, Dirang (India). Genetic and phenotypic parameters of body weight traits in yak. Indian Journal of Animal Sciences (India). (Aug 2009) v.79(8) p.836-837
Keywords: body weight. Heritability. Yaks.
Heritability estimates of weight at birth, 3 month, 6 month, 9 month, 12 month, 18 month and 24 month of age in yaks were 0.237, 0.326, 0.333, 0.378, 0.359, 0.429, and 0.409, respectively. Genetic correlations between various traits ranged from (0.177 to 0.954) and were higher for all combinations of traits except the combinations involving the birth weight. Genetic correlations of weight at later ages (18- month body weight and 24-month body weight) with weight at 3-month were 0.777 and 0.524, respectively, while that with weight at 6-month were 0.920 and 0.878, restrictively. Phenotypic correlations were all positive (0.037 to 0.904). The results indicated that weight at 4-month of age would be the best criteria of selection for desired body weight in yaks. However, preliminary selection could be practiced based on body weight at very younger age (3 month).

0373. Roy, Angan; Indira Gandhi Krishi Vishwa Vidyalaya, Durg (India) Tiwari, S P; Indira Gandhi Krishi Vishwa Vidyalaya, Durg (India) Sanyal, P K; Indira Gandhi Krishi Vishwa Vidyalaya, Durg (India) Pathak, Raina; Indira Gandhi Krishi Vishwa Vidyalaya, Durg (India). Evaluation of anthelmintic efficacy of Med-UMMB and tannin against gastrointestinal nematodosis in goat kids. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.841–843 Keywords: digestive system. Anthelmintics. Tanning.

A study was conducted on 20 indigenous goat kids allocated into 5 different groups. All animals were offered ad lib rice straw and berseem hay (40:60). Group 1 was fed concentrate mixture (100g/d). Groups 2,3,4 and 5 were supplemented with urea molasses mineral block (UMMB), medicated urea molasses mineral block (Med-UMMB containing fenbendazole .5g/kg), tannin (5% of DM) and UMMB plus tannin (5% of DM) respectively. The animals were given trickle infection (200L3/d) of gastrointestinal nematodes (*Haemonchus* sp. and *Cooperia* sp. in the dose ratio of 9:1) for consecutive 10 days. The kids were found infected with *Haemonchus* sp. and *Cooperia* sp. Based on EPG values, the highest efficacy (100%) against gastrointestinal nematodes was attained, following treatment with Med-UMMB, tannin and UMMB plus tannin on day 15 post-treatment, whereas efficacy of 75% was recorded for UMMB against gastrointestinal nematodes 15 DPT.

0374. Kumar, Ravinder; Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (India)Singh, Rajbir; Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (India). Incidence of utero-veginal prolapse among the buffaloes under field conditions of Western Uttar Pradesh. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.847–849 Keywords: farmers. Seasons. Uterus. Water buffaloes. Oestrous cycle. Endometritis.

Present study was conducted on 2160 respondent buffaloes in three districts of Western Uttar Pradesh, to study the various reproductive problems and managerial practices following locally available indigenous resources. The observations were pooled on the basis of season, parity, farmer's categories, locations. The overall incidence of prepartum and post-partum utero-vaginal prolapse was 2.66 and 4.07% among the 2701 observations. Highest numbers of buffaloes were found in pre-partum and post-partum uterovaginal prolapse condition as 3.63 and 4.97% in summer, 4.16 and 6.62% first and second calvers and 3.07, 5.97% buffaloes belonging to marginal and large farmers, respectively. Statistically, only the effect of parity order was highly significant on the post-partum prolapse in buffaloes.

0375. Singh, R C; Central Institute of Agricultural Engineering, Bhopal India)Singh, C D; Central Institute of Agricultural Engineering, Bhopal India). Effect of age and body size on the work output of Malvi and crossbred oxen. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.850–852 Keywords: Draught animals. Energy. Energy sources. Bullocks.

The relationship among the draught capability, and work output in relation to the age and body weight was studied for the Malvi and crossbred (Jersey and Red Sindhi) oxen. A critical age group of 4.5 – 12 years has been identified for the animals to derive the maximum work output. The draught ability of Malvi breed of bullock was higher as they produced maximum work output. The draught ability of Malvi breed of bullock is higher and produced maximum work output of 1.5–1.62 kWh at draught load equivalent to 12% of their body weight as compared to crossbred bullocks. The maximum work output of crossbred oxen is 1.32 –1.44 kWh at draught load equivalent to 10% of their body weight without fatigue. The energy required for metabolism varied from 5933.98 to 7104.22 kcal/day for both breeds of bullock while the endogenous nitrogen consumption was from 11 080 to 13 270 mg.

0376. Cheede, G S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Pangaonkar, G R; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Singh, Jagir; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Effect of ascorbic acid and chloroquine diphosphate on the quality and fertility of buffalo semen. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.858–860 KEYWORDS: Ascorbic acid. Water buffaloes. Fertility. Semen. Quality.

The present investigation was carried out to assess the effect of ascorbic acid, an antioxidant and chloroquine diphosphate, a membrane stabilizer, on the quality and fertility of buffalo bull semen. Neat, post equilibrated and post thawed semen with additives (ascorbic acid 0.02% or chloroquine diphosphate 10–5M) and without additives (control) was subjected to microscopic examination for percent individual motility, live sperms count and head abnormalities. Healthy, normal cycling buffaloes (62) were inseminated with post-thaw semen with ascorbic acid (n=21), chloroquine diphosphate (n=22) and without additives (n=19). Semen extended with additives had significantly higher individual motility and live sperm. The overall conception rate was 42.1, 57.14 and 54.54% with control, ascorbic acid or chloroquine diphosphate fortified semen, respectively. It is concluded that supplementation of ascorbic acid or chloroquine diphosphate to extender improved the semen quality and fertility of buffalo bull semen.

0377. Dadarwal, D.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Ghuman, S P S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Honparkhe, M; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Singh, Jagir; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Synchronization of ovulation and subsequent fertility in buffaloes following PGF₂α-PGF₂α protocol, with or without GnRH. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.861–865 KEYWORDS: Water buffaloes. Corpus luteum. Ovule culture. Progesterone. Prostaglandins.

A PGF₂α-based protocol, with or without GnRH, was used to synchronize ovulation and assess subsequent fertility in cycling buffaloes. In protocol-A (n=6) and protocol-B (n=6), buffaloes were administered, at unknown stage of estrous cycle, 2 PGF₂α injections (1 mg cloprostenol each) 12 days apart, whilst buffaloes of protocol-B received an additional GnRH injection (0.02 mg buserelin) at 48 h after second-PGF₂α. Buffaloes were artificially inseminated (AI) twice at 48 and 72 h after second-PGF₂α. The luteal profile of day 0 reached basal values in all the buffaloes at 72 h subsequent to first-PGF₂α on day 0. The ovulatory follicles observed on day 0, ovulated between 48–120 h subsequent to first-PGF₂α in 92 per cent buffaloes. In response to second-PGF₂α on day 12, all the buffaloes exhibited luteal regression and displayed onset of estrus around 24 h after second-PGF₂α. Ovulation in response to second-PGF₂α induced luteolysis was observed in all the buffaloes between 72–96 h after second-PGF₂α. Conception of buffaloes was similar across treatments at 42nd day (50%). The administration of GnRH in protocol-B had no effect on time of ovulation or conception. In summary, 2 injections of PGF₂α administered 12 day apart in cycling buffaloes were highly efficacious for synchronizing ovulation and thus, permitting fixed-time AI at 72 h after second-PGF₂α which results in good enough fertility.

0378. Singh, A K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Brar, P S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Gandotra, V K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Nanda, A S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Prakash, B S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Variations in hypophyseal responsiveness to synthetic GnRH-induced LH release and reproductive performance in dairy buffaloes with luteal activity during early postpartum period. Indian Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.866–870 KEYWORDS: Pituitary gland. Water buffaloes. Perinatal period. Progesterone. Dairy cattle.

Elevated luteal activity immediately following parturition reduces the reproductive performance in terms of prolonged anestrus that results in serious economic constraints to buffalo breeders. The present study was undertaken with the objective to investigate the changes in pituitary responsiveness to synthetic GnRH in 15 lactating buffaloes at 25–35 days post-partum. On the basis of progesterone profile for at least 2 consecutive samples, they were categorized into 2 groups i.e. with elevated luteal activity (plasma P4 > 1.0 ng/ml; n = 9) and reduced luteal activity (plasma P4 < 1.0 ng/ml; n = 6), respectively. In conclusion, buffaloes with elevated compared to reduced luteal activity had suppressed pituitary responsiveness to synthetic GnRH challenge and poor reproductive performance during early postpartum period.

0379. Sood, Pankaj; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India)Nanda, A S; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India)Singh, Narinder; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India) Gandhotra, V K; Guru Angad Dev Veterinary and Animal Science University, Ludhiana (India). Follicular dynamics in crossbred cows. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.887–889 KEYWORDS: Cows. Ovarian cysts. Crossbreeding. Ova.

The study was conducted to observe the follicles and luteal changes during spontaneous estrous cycle in the crossbred cows raised in Indian conditions. The temporal and morphological results on ovarian follicles provided a rationale for similarity and compatibility of follicular dynamics in the present study with the available literature. There was a conspicuous difference in the size and growth rates of the dominant follicles despite of which the wave like phenomenon persisted.

0380. Konch, H; Assam Agricultural University, Guwahati (India)Dutta, A; Assam Agricultural University, Guwahati (India)Baruah, K K; Assam Agricultural University, Guwahati (India)Sinha, S; Assam Agricultural University, Guwahati (India). Serum thyroid hormone levels during different stages of gestation in Hampshire gilts following synchronization of oestrus by PGF₂a analogue. *Indian Journal of Animal Sciences (India)*. (Dec 2009) v.79(12) p.1222-1223 KEYWORDS: Pregnancy. Thyroid hormones. Sows. Oestrus synchronization.

Serum thyroid hormone levels were estimated during different stages of gestation in Hampshire gilts after synchronization of oestrus by PGF₂ alpha analogue. Healthy gilts (18) were divided equally into 3 groups consisting of 6 gilts in each group. Group 1 gilts were treated with a single dose of PGF₂ alpha analogue on day 13th of oestrus cycle. Gilts of group 2 were treated with two doses of PGF₂ alpha analogue at 11 days apart whereas group 3 gilts were kept as control. All the animals were allowed to mate naturally with a breeding boar with proven fertility two times following synchronization of oestrus. Blood samples were collected on the day before treatment, day of oestrus (day 0) and subsequent collections were done at 15 days interval till farrowing. The mean serum T₃ and T₄ concentrations on the day of oestrus increased significantly in all the treated groups than the concentration on day before treatment. Thereafter a decreased of both T₃ and T₄ concentrations was recorded from day 15 to day 105 of gestation in all the groups, however on the day of farrowing, the concentration of both hormone again increased significantly.

0381. Mondal, G; Sher-e-Kashmir University of Agricultural Sciences and Technology. Kashmir (India). Growth and reproductive performance of local sheep and goats in Kargil region (Ladakh). *Indian Journal of Animal Sciences (India)*. (Dec 2009) v.79(12) p.1229-1232 KEYWORDS: Goats. Growth. Reproduction. Sheep.

The objective of the study was to evaluate effect of various feed ingredients usually fed to the animals, on body weight, body measurements on 0–3, 3–6, 6–12 and more than 12 months of age. Reproductive performance of sheep and goats were also determined under field condition in various blocks of Kargil. Chemical composition of different feed ingredients usually fed to the animals were analyzed. Body weight was non-significant between 3–6 and 6–12 months age group but significantly higher than 0–3 months, though, 12 months age group had the highest body weight than all other age groups in both the species. Body length was significantly higher in 3–6 and 6–12 months age group than 0–3 months, whereas the highest value recorded in 12 months age group. Chest girth in goats, varied significantly among various age group but in sheep 0–3 and 3–6 months age group had significantly lower than 6–12 and 12 months age group. Height at wither in 6–12 and 12 months age group had non-significantly different but significantly higher than other 2 age groups, whereas in sheep 3–6 months, and 6–12 months had significantly higher (P<0.05) than 0–3 months age group and highest value obtained in 12 months age group. More than 15% crude protein (CP) observed in lucerne hay, iris, mulberry and red clover leaves. Grains had 6–10% CP, whereas the straws had the lowest CP content. The neutral detergent fibre (NDF) content higher in apple leaves (60.29%) followed by IRIS (53.62%) among the hay and tree leaves, whereas, the grains had higher soluble carbohydrate content. Total ash content varied from 6.87% in oats to 12.76% in *Chenopodium* sp. Weight and age at puberty, age at first conception, lambing/kidding percentage and oestrus cycle length was similar in both the species however, oestrous

duration in goat was higher than sheep. It was concluded that the growth of sheep and goat is poor in comparison to other places due to harsh climatic condition as well and unavailability of quality feeds for long duration during the year. Though, reproductive performance was comparable to other breeds of sheep and goat of other regions in India.

0382. Pankaj, P K; National Dairy Research Institute, Karnal (India) Raina, V S; National Dairy Research Institute, Karnal (India) Roy, B; National Dairy Research Institute, Karnal (India) Mohanty, T K; National Dairy Research Institute, Karnal (India) Gupta, A K; National Dairy Research Institute, Karnal (India). Critical control points at the level of collection, processing and preservation of Sahiwal bull semen. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.992–1000 KEYWORDS: Processing. Quality controls. Semen. Sterilization. Bulls.

The present investigation was conducted on Sahiwal bulls to study the various critical control points in frozen semen processing. On each collection, 2 ejaculates were taken in succession and examined for various standard laboratory tests (mass activity, individual motility, non-eosinophilic count, sperm abnormalities, acrosomal integrity, microbial load etc.). The various critical control points under study were sterilization method for glassware or collection tube of artificial vagina, treatment of water to be used for making extender, sterilization method for buffer to be used for making extender, processing room temperature and osmolality of extender. Microwave oven method of sterilization was superior to hot air oven taking into account the time saving. The Resin based water purification system was better than triple distilled water and water obtained from this system should not be stored for more than 3 days. Both methods of buffer treatment (autoclaving/filtration) were equally effective in terms of semen quality and microbial count. Osmolality of extender should be kept between 240 to 260 mOsmol/kg to maintain optimum quality semen. Processing room temperature should be kept in the range of 22 to 24°C for quality semen production. The results indicated that critical control points monitoring should be made mandatory for all semen processing laboratories. Further in vivo study with various treatments should be carried out to test its real field applicability.

0383. Rajhans, Rajib; Indian Veterinary Research Institute, Izatnagar (India) Kumar, G Sai; Indian Veterinary Research Institute, Izatnagar (India) Chandra, Vikash; Indian Veterinary Research Institute, Izatnagar (India) Mishra, Ashish; Indian Veterinary Research Institute, Izatnagar (India) Sharma, G Taru; Indian Veterinary Research Institute, Izatnagar (India). Total RNA content in buffalo oocytes and different stages of preimplantation embryos produced in vitro. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1004–1006 KEYWORDS: Water buffaloes. Rna. Ova.

Total RNA content can be used as a preliminary indicator of intrinsic quality of in vitro matured (IVM) oocytes and preimplantation stage embryos. The present study was conducted to assess the total RNA content of different preimplantation stage buffalo (*Bubalus bubalis*) embryos and to study the effect of vitrification on the total RNA content of in vitro matured buffalo oocytes. The amount of total RNA in the pools of immature oocytes (IM, 120), in vitro matured oocytes (MO, 120), preimplantation stage embryos 8–16 cell (8–16, 47), morula (M, 13), blastocyst (B, 7) as well as in the in vitro matured and vitrified oocytes (MV, 120) was quantified spectrophotometrically. Total RNA content (ng/oocyte or embryo) was reduced slightly from immature (2.24 ± 0.40) to matured oocyte (1.66 ± 0.53) followed by a significant ($P < 0.01$) decline from 8–16 cell (1.03 ± 0.19) to morula (0.72 ± 0.04). At the blastocyst stage (4.73 ± 1.09) there was a significant ($P < 0.01$) increase in the total RNA content. There was no significant difference between total RNA content of in vitro matured control oocytes and vitrified oocytes, indicating that vitrification had no effect on the RNA content of in vitro matured oocytes.

0384. R Ranjan; Central Institute for Research on Goats, Mathura (India) Ramachandran, N; Central Institute for Research on Goats, Mathura (India) Jindal, S K; Central Institute for Research on Goats, Mathura (India) Sinha, N K; Central Institute for Research on Goats, Mathura (India). Hypo osmotic swelling test in frozen thawed goat

spermatozoa. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1022–1023 KEYWORDS: goats. Spermatozoa. Tail. Osmotic stress.

Under the conditions of this study, HOST proved to be a suitable technique for testing membrane status of goat spermatozoa. It could be a valuable and practical tool for accurate assessment of the individual sperm cell rather than the population as a whole. The concentration of 75 mOsm/l hypo osmotic solution appeared to be the most adequate for use in HOST for goat frozen-thawed goat spermatozoa and it could aid the routine analyses of goat semen.

0385. Singh, Opinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Kumar, Anoop; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Histoenzymic distribution pattern in liver of buffalo fetuses during prenatal development. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1030–1032 KEYWORDS: Water Buffaloes. Liver. Enzymes. Perinatal period. Histoenzymic distribution of oxidoreductases and phosphatases was studied in liver of buffalo fetuses ranging from 5 cm to 75 cm CRL (crown rump length). The succinic dehydrogenase (SDH), lactic dehydrogenase (LDH), reduced nicotinamide adenine dinucleotide diaphorase (NADHdiaphorase), reduced nicotinamide adenine dinucleotide Figs A–F: A. Liver of buffalo fetus of 44.5 cm CRL showing NADPH activity in hepatocytes surrounding the sinusoids. Nitro BT method×70. B. Cryosection of liver from 28.0 cm CRL buffalo fetus showing SDH activity in parenchyma. Nitro BT method×140. C. Cryosection of liver from 70.0 cm. CRL buffalo fetus showing weak MAO activity in parenchyma. Nitro BT method×70. D- Liver of buffalo fetus of 22.5 cm CRL showing strong AKPase activity in parenchyma of liver. Azodye method×140. E. Section of liver of from 70.0 cm CRL buffalo fetus showing strong ACPase activity in the parenchyma. Azodye method×70. F. Section of liver of from 22.5 cm CRL buffalo fetus showing moderate G–6–Pase activity in liver parenchyma. Lead nitrate method×70. D A E B F phosphate diaphorase (NADPH-D) and monoamine oxidase (MAO) exhibited variable activity in parenchyma of liver which may be attributed to developing histoarchitecture and activity of liver. Since the hemopoiesis took place during early prenatal period, the hemopoietic areas were weakly reactive. The activity of alkaline phosphatase, acid phosphatase and glucose–6–phosphatase was also recorded.

0386. Mishra, A K; Central Sheep and Wool Research Institute, Avikanagar (India)Arora, A L; Central Sheep and Wool Research Institute, Avikanagar (India)Prince, L L L; Central Sheep and Wool Research Institute, Avikanagar (India)Gowane, G R; Central Sheep and Wool Research Institute, Avikanagar (India)Kumar, S; Central Sheep and Wool Research Institute, Avikanagar (India). Lifetime litter size and ewes productivity efficiency of Garole×Malpura crossbred sheep. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1075–1077 KEYWORDS: Ewes. Litter size.

The prolific Garole sheep was crossed with nonprolific Malpura sheep. To evaluate the lifetime (7 years of age) litter size (LLS), number of lambs weaned (LLW) and ewe's productivity efficiency (LEPE) in Garole×Malpura (GM) crossbred sheep. The majority (53.49%) of GM ewes completed 5 or more parity as against 45.75% of Malpura ewes in their life span. The GM ewes resulted in 67.76 and 54.63% higher LLS and LLW, respectively compared to Malpura. The GM ewes weaned 10.65% higher total litter weight as compared to Malpura ewes and at 12 months age the difference was 13.19% in favour of GM ewes. The study indicated that the LLS, LLW and LEPE of GM ewes were comparatively higher than that of Malpura.

0387. R Ranjan; Central Institute for Research on Goats, Mathura (India)Ramachandran, N; Central Institute for Research on Goats, Mathura (India)Jindal, S K; Central Institute for Research on Goats, Mathura (India)Sinha, N K; Central Institute for Research on Goats, Mathura (India)Goel, A K; Central Institute for Research on Goats, Mathura (India)Kharche, S D; Central Institute for Research on Goats, Mathura (India). Effect of egg yolk levels on keeping quality of Marwari buck semen at refrigeration temperature. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.662-664 KEYWORDS: Egg yolk. Refrigeration. Temperature. Semen. Quality. Ejaculates (6) from adult Marwari bucks maintained at CIRCi Makhdoom under semi intensive management system during October to November 2007 were utilized for the present study to find out the viability and

motility of buck semen at different levels of egg yolk during different hours of preservation at refrigeration temperature. The ejaculates were collected at weekly intervals using artificial vagina and were extended at the rate of 1:10 with tris- citric acidfructose (TCF) diluent having 2.5%, 5%, and 7.5% and 10% egg yolk by volume and preserved up to 72 h in refrigerator. Analysis of data revealed that sperm motility differed significantly at different levels of egg yolk up to 72 h of preservation. The mean sperm motility recorded at 0, 24, 48, 72 h of preservation in 7.5% egg yolk level were 85.00 ± 1.29 , 63.33 ± 1.05 , 50.00 ± 1.82 and $44.17 \pm 1.54\%$, respectively, with the overall motility of $60.62 \pm 3.34\%$. The corresponding figures in 10% egg yolk were 85.00 ± 1.29 , 69.17 ± 1.54 , 61.67 ± 1.67 , 55.00 ± 2.24 and $67.71 \pm 2.46\%$. Neither egg yolk levels nor the storage periods had any significant effect on sperm viability. The live sperm count were 89.00 ± 1.53 , 86.17 ± 2.75 , 84.67 ± 1.87 and $83.17 \pm 1.01\%$ at 0, 24, 48, 72 h of preservation in 10% egg yolk level at refrigeration temperature. The percentage of sperm motility was more than 50% in 10% egg yolk level even at 72 h of preservation. Overview of the results in the present study indicated that Marwari buck semen extended in the diluent having 10% egg yolk levels could be stored up to 72 h at refrigeration temperature for further use as liquid semen for Artificial Insemination.

0388. Sethi, R S; Guru Angand Dey Veterinary and Animal Sciences University, Ludhiana (India) Singh, Opinder; Guru Angand Dey Veterinary and Animal Sciences University, Ludhiana (India) Kumar, V; Guru Angand Dey Veterinary and Animal Sciences University, Ludhiana (India). Histochemical study on distribution of mucopolysaccharides in trachea of buffalo during prenatal development. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.673-674 KEYWORDS: Water buffaloes. Foetus. Trachea. Mucopolysaccharides. Perinatal period.

Histochemical studies were made on trachea of buffalo fetuses ranging from 4.3 to 44 cm CRL (crown rump length) to elucidate distribution of neutral and acid Mucopolysaccharides. During initial development up to 15.8 cm CRL tracheal epithelium was strong to moderately positive for neutral mucopolysaccharides. The ground substance of developing cartilage primordia was weakly positive for acid mucopolysaccharides, however developing chondroblasts were PAS (Periodic acid Schiff) positive. At 29.5 cm CRL acid mucopolysaccharide lining was present on the surface of PAS positive epithelial cells. The primordia of tracheal glands were positive for neutral mucopolysaccharide. The hyaline cartilage at this stage was having high acid mucopolysaccharide content. At 44 cm CRL surface epithelial cells were having alcian blue positive cilia where as propria submucosa was having high acid mucopolysaccharide content with well developed PAS positive submucosal tracheal glands.

0389. Bansal, Neelam; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Uppal, Varinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Roy, K S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Pathak, Devendra; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Prenatal development of spinal cord and spinal nerves in buffalo (*Bubalus bubalis*). Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.381–383 KEYWORDS: Water buffaloes. Perinatal period. Spinal cord.

The study was conducted on the spinal cord of 6 buffalo foetii ranging from 3.0 cm CRL to 5.5 cm CRL with an estimated age of 42–53 days. The study revealed that at 3.0 cm CRL the spinal cord was differentiated by the presence of aggregation of neuroepithelial cells. At 3.5 cm CRL, these cells were proliferating to form a second layer around the initial columnar cells and all the 3 layers were well distinguished from inwards to outwards as ependymal, mantle and marginal layers. The neurocoele regressed to form central canal in adult animals. The neurons started differentiating into mantle layer and axonal processes. A 5.5 cm CRL ventral fissure appeared earlier than the dorsal one. Formation of dorsal root ganglion from the neurons and glial cells derived from neural crest cells started at 3.5 cm CRL. Formation of dorsal and ventral roots of spinal nerves also appeared at 3.5 cm CRL and both roots joined together to form mixed spinal nerve at 5.5 cm CRL.

0390. Das, Gunjan; Indian Veterinary Research Institute, Izatnagar (India)Sharma, M C; Indian Veterinary Research Institute, Izatnagar (India)Joshi, Chinmay; Indian Veterinary Research Institute, Izatnagar (India)Tiwari, Rupasi; Indian Veterinary Research Institute, Izatnagar (India). Haemato-biochemical profile in relation to minerals in cattle of Tripura State. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.449–450 KEYWORDS: Blood. Progesterone. Thyroid hormones.

Haemato-biochemical profile in relation to serum mineral in cattle of Tripura state were studied. Lower values of AST and ALT and higher values of AKP were observed in all samples. Haemoglobin, packed-cell volume and total erythrocytes count were on lower side in all samples. Significantly lower values of T3 and T4 were observed in all samples. The average values of estrogen and progesterone were on lower trend in all animals.

0391. Singh, R.K.; Indian Veterinary Research Institute, Izatnagar, (India)Bag, Sadhan; Indian Veterinary Research Institute, Izatnagar, (India)Das, B.C.; Indian Veterinary Research Institute, Izatnagar, (India)Majumdar, A.C.; Indian Veterinary Research Institute, Izatnagar, (India). Effect of culture temperature and gaseous phase on embryo development in goat. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1107–1110 KEYWORDS: Embryonic development. Goats. Gases. Heat.

The present study was carried out to study the effect of different gaseous phase and culture temperature on in vitro oocyte maturation, fertilization and embryo development in goat. Goat oocytes were matured in TCM-199 with HEPES, 10. FBS, 10. follicular fluid, 0.5 µg/ml FSH, 10 IU/ml LH, 0.5 µg/ml estradiol for 27 h. The mature oocytes were fertilized with freshly ejaculated sperm in TALP media and cultured in mSOF media without any cell supplementation. The in vitro maturation, fertilization and culture (IVMFC) were done at different gas phases (C1=5. CO₂, 20. O₂; C2=5. CO₂, 10. O₂; C3=7.5. CO₂, 20. O₂; C4=7.5. CO₂, 10. O₂) at 38.5°C as well as 40.5°C in CO₂ incubator with maximum humidity. The oocyte maturation rate was 82.78, 87.57, 75.71 and 75.65%, respectively, when oocytes were cultured at C1, C2, C3 and C4 at 38.5°C. The oocyte maturation rate was significantly higher in C2 as compared to C3 and C4. Although there was no significant variation of cleavage rate among the 4 gaseous conditions, it was comparatively higher in C1 (9.44%) as compared to C2, C3 and C4. The development of 4–8 cell and morula stage embryos were also not significantly different among these different gas phases. However, the number of 4–8 cell and morula stage embryos was comparatively higher in C1 condition. The percentage development of 4–8 cell stage embryos was comparatively lower in C4 conditions as compared to C1, C2 and C3. Similarly, the rate of development of morula stage embryos was comparatively lower (1.13%) in C2 condition as compared to C1, C3 and C4. It was also observed that the oocyte maturation rate, cleavage rate and embryo development was lower in 40.5°C as compared to 38.5°C. The present study indicated that alteration of gaseous phase did not have any significant effect on oocytes maturation and embryo development although the maturation rate was significantly higher in 5. CO₂ and 10. CO₂ in goat when oocytes were cultured at 38.5°C. Further it was also observed that higher culture temperature had significantly detrimental effect on the success of IVMFC in goat.

0392. Sethi, R.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Roy, K.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Singh, Opinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Histological study on the fibrous architecture of the adrenal gland during prenatal development in buffalo. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1120–1123 KEYWORDS: Adrenal glands. Water buffaloes. Perinatal period.

The study was conducted on the adrenal glands of 43 buffalo fetuses ranging from 39 mm to 890 mm crown rump length (CRL). Very few and fine collagen fibres and reticular fibres were observed in the peripheral areas of the adrenal primordia and aggregates of neuroectodermal tissue by 109 mm CRL stage. The glands were fully encapsulated in the fibrous tissue, predominantly made up of collagen fibres by 210 mm CRL stage. The connective tissue trabeculae made up of collagen and reticular fibres arose from the inner aspect of the capsule by 250 mm CRL stage. The trabeculae pierced cortical parenchyma of the gland to reach the medulla along with the medium sized blood vessels and nerve fibres. The inner aspect of the capsule had higher proportion of reticular fibres that entered into cortical and medullary tissue and arranged the parenchyma

into follicular form in 470 mm CRL and onward stages. The definite cortex and outer zone of medulla had a higher proportion of reticular fibres. The capsule became fibromuscular had high proportion of collagen fibres intermingled with the reticular fibres, smooth muscle cells and a good number of blood vessels and nerve fibres. The elastic fibres were not observed in any part of the gland up to 890 mm CRL stages, however, they were present in the wall of blood vessels and perivascular tissue.

0393. Sethi, R.S.; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Singh, Opinder; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Morphogenesis of neurohypophysis during prenatal development in buffalo. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1134–1135 KEYWORDS: Water buffaloes. Foetus. Morphogenesis. Pituitary gland.

The study was conducted on 19 buffalo foetuses ranging from 30 mm to 630 mm crown rump length (CRL). The tubular infundibulum evaginated from the diencephalon at 35 mm CRL. It was in close contact with the caudal wall of the Rathke's pouch and was lined with tall ependymal cells. At 43 mm CRL infundibulum became perpendicular to long axis of the foetus and showed cellular proliferation and foldings which resulted in the differentiation of neurohypophysis at 60 mm CRL. The lumen of the infundibulum disappeared at 80 mm CRL stage. The pars distalis, pars intermedia and hypophyseal cleft were seen enwrapping the neurohypophysis at 120 mm CRL and onward stages.

0394. Maurya, V.P.; Central Sheep and Wool Research Institute, Rajasthan (India)Kumar, S.; Central Sheep and Wool Research Institute, Rajasthan (India)Kumar, D.; Central Sheep and Wool Research Institute, Rajasthan (India)Gulyani, R.; Central Sheep and Wool Research Institute, Rajasthan (India)Joshi, A.; Central Sheep and Wool Research Institute, Rajasthan (India)Naqvi, S.M.K.; Central Sheep and Wool Research Institute, Rajasthan (India)Arora, A.L.; Central Sheep and Wool Research Institute, Rajasthan (India)Singh, V.K.; Central Sheep and Wool Research Institute, Rajasthan (India). Effect of body condition score on reproductive performance of Chokla ewes. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1136–1138 KEYWORDS: Body condition. Parturition. Copulation. Sheep.

Body condition scoring (BCS) is a simple, non-invasive, time saving and beneficial technique to rank ewes according to their body reserve by sight and touch. The aim of the present study was to evaluate the impact of different BCS on reproductive performance of Chokla ewes in semi-arid region of India. Adult Chokla ewes (150) were used to study the effect of body condition score (BCS) on lambing rate and birth weight of lamb. Ewes were classified as per their BCS on 1 to 5 scale of half unit increment with 1 being an extremely thin and a 5 being fatty ewe. The ewes of 2.5, 3.0 and 3.5 BCS were marked as group1 (G1), group 2 (G2) and group 3 (G3), respectively. The heart girth (HG), pin shoulder length (PSL) and body weight of ewes were recorded at the time of mating. The gestation length, lambing rate and birth weight of lamb were also recorded during experiment. The HG, PSL and body weight of G1 ewes were significantly lower as compared to G2 and G3 groups ewes. The highest lambing rate was obtained in ewes of G2 group followed by ewes of G3 and G1 groups. The birth weight of lambs born from ewes of G1 group was significantly ($P < 0.05$) lower as compared to ewes of G2 and G3 groups. The results indicated that the BCS of 3 or 3.5 at the time of mating resulted higher lambing rate and as well as more birth weight of lambs per lambing. Hence, attempt should be made to maintain majority of the ewes in the BCS of 3 to 3.5 during mating to get optimum productivity.

L70 Veterinary science and hygiene

0395. S. Rajurker, Rekhe, D.S., Maini, S., Ravikanth, K. (College of Veterinary and Animal Science, Parbhani (India) Dept. of Pharmacology & Toxicology). Acute toxicity studies of polyherbal formulation (Methiorex Premix). Veterinary World (India) (Feb 2009) V.2(2) p. 58-59. Keywords: Toxicity, Polyherbal, Broiler chickens, Albino Rat, laboratory Animals.

An experimental study with the objective to evaluate the acute toxicity of polyherbal formulation Methiorep Premix (supplied by Ayurved Ltd., Baddi, India), was done as per OECD guidelines 423. Methiorep is a scientifically developed combination of herbs that contains herbal ingredients rich in Methionine in free form as well as conjugated form. The study was done on 3 males and 3 female Wistar Albino rats which were administered an initial dose of 500 mg/kg body weight followed by 2000 mg/kg & 5000 mg/kg body weight. The animals were observed for signs of convulsions, tremors, circling, depression, excitement and mortality. Body weight was recorded at 0,7th and 14th day and plasma total protein, albumin; AST and ALT were measured to evaluate the toxicity of the preparation. No abnormal sign of symptoms were observed in any of the animal fed with Methiorep Premix at the dose rate of 500 mg/kg body weight, 2000 mg/kg body weight & 5000mg/kgbody weight. No mortality was observed in any of the animals indicating its safety.

0396. Minakshi; CCS Haryana Agricultural University, Hisar (India) Prasad, G; CCS Haryana Agricultural University, Hisar (India) Grover, Y P; CCS Haryana Agricultural University, Hisar (India). Occurrence of dual infection of bovine group A rotavirus in diarrhoeic calf in Haryana, India. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1205-1208 KEYWORDS: Bovine diarrhoea pestivirus. Bovinae. Calf diarrhoea rotavirus. Infection. Haryana.

Group A bovine rotaviruses (BRVs) responsible for neonatal calf diarrhoea, have characteristic segmented genome with 11 monocistronic dsRNA segments. These segments are arranged in a pattern of 4:2:3:2 where segments 7, 8, and 9 were grouped as a triplet, typical of group A rotaviruses. However, the RNA extracted from faecal samples of 2 diarrhoeic calves showed more than 11 classical segments in silver stained gels. One of the diarrhoeic samples showed 3 additional segments whereas the other had 2 extra genomic segments in the stained gels. Thereby, suggesting the presence of more than 1 rotavirus genotype in an individual calf. The application of reverse transcription-polymerase chain reaction (RT-PCR) based G and P genotyping of rota viral RNA yielded 2 G type (G6 and G10) and 1 common P8 [11] type specific amplicon. These findings further confirmed the presence of dual infection in diarrhoeic calves. The presence of extra genomic RNA segments and detection of dual infection by RT-PCR in diarrhoeic calf has been reported probably for the first time in this part of the country. These findings suggested that multiple rotavirus genotypes were simultaneously circulating on the same farm. Continuous surveillance is essentially required for proper management and development of effective and sensitive diagnostic tools for control of infection on the animal farms.

0397. Folia, G; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Jand, S K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Arora, A K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Oberoi, M S; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Comparative analysis of outer membrane protein profile of *Pasteurella multocida* serotype B:2 grown under iron regulated conditions. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1212-1214 KEYWORDS: Membranes. Proteins. *Pasteurella multocida*. *Pasteurella*. Serotypes.

The present study was undertaken to study the protein profile of *Pasteurella multocida* grown under iron regulated conditions. SDS-PAGE analysis of OMPs of P multocida serotype B:2 grown on BHI agar and iron replete conditions revealed more than 12 protein bands ranging from 26 to 100 kDa molecular weight and in iron deplete conditions additional two protein bands with molecular weight of 101 kDa and 104 kDa were observed. On basis of stain intensity 32 kDa protein appeared to be major protein band. Immunoblotting studies carried out by homologous antisera revealed that 32 kDa protein band was immunodominant. In case of nitrocellulose membrane probed with homologous convalescent sera raised in iron deplete conditions, additional protein bands of 101 kDa and 104 kDa molecular weight were immunodominant.

0398. Kavitha, K Lakshmi; College of Veterinary Science, Tirupati (India) Chetty, M Satyanarayana; College of Veterinary Science, Tirupati (India). Serological and molecular diagnosis of goat-pox virus. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1215-1217 KEYWORDS: Capripoxvirus. PCR. Immunodiagnosis.

Four isolates of goat-pox virus (TPT, KDP, ANI and CHI) were isolated and purified. Agar-gel immunodiffusion test, counter immunoelectrophoresis and indirect-ELISA were used in the diagnosis of antibodies against goat-pox. Indirect-ELISA was more sensitive compared to CIE and AGED. The PCR was able to detect as low as 30 mg of goat-pox viral DNA. Sequencing revealed 97% sequence homology with the complete nucleotide sequence of Sambalpur strain of goat-pox genome (Gene bank accession number FJ716697).

0399. Samiran Bandyopadhyay; National Research Centre on Yak, ICAR, Dirang (India) Krishna Sharma,; National Research Centre on Yak, ICAR, Dirang (India) Sutapa Das,; National Research Centre on Yak, ICAR, Dirang (India) Tapas K Biswas,; National Research Centre on Yak, ICAR, Dirang (India) Monoj K Ghosh And; National Research Centre on Yak, ICAR, Dirang (India) Manajit Bora; National Research Centre on Yak, ICAR, Dirang (India). Serum antibody response in yaks (*Capra hircus*) following trivalent oil adjuvant FMD vaccination. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1218-1219 KEYWORDS: Aphthovirus. Vaccines. Yaks.

The present investigation was carried out to determine the antibody response in yaks using liquid phase blocking ELISA (LPBE) following trivalent oil adjuvant FMD vaccine (O, A, Asia-1). On 30 days of post vaccination (dpv), there was a sharp rise to the antibody titres against all the 3 serotypes. The antibody titre against O and A following 60 days of vaccination was maintained higher level with slight fall against Asia-1. However, a drastic fall of antibody titres against all the 3 serotypes was observed at 120 dpv following vaccination. Again, following the application of a booster antibody titres were restored to the higher level (O: 2.1 ± 0.12 , A: 2.07 ± 0.11 , Asia-1: 2.07 ± 0.16). To our knowledge, it is the first report regarding antibody response in yaks following FMD vaccination.

0400. R Chandra; National Dairy Research Institute, Karnal (India) Mehla, R K; National Dairy Research Institute, Karnal (India) Sirohi, S K; National Dairy Research Institute, Karnal (India) H Rahman; National Dairy Research Institute, Karnal (India). Effect of probiotic supplementation on growth of crossbred calves. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1254-1257 KEYWORDS: Animal health. Calves. Diarrhoea. Probiotics.

The study was undertaken to know the effect of probiotic supplementation on growth and health of crossbred calves. Crossbred (Holstein Friesian \times Thaparkar and Brown Swiss \times Sahiwal) female calves (24) 12-day-old were randomly divided into 2 groups of 12 each. Both groups were maintained under same managerial conditions and fed similarly except the treatment group was supplemented with *Lactobacillus acidophilus* plus *L. paracasei* 5×10^9 (cfu/head/day) for 12 weeks. The average dry matter intake/day was higher in treatment group as compared to control group. The average daily weight gain was significantly higher in treatment group (601.55 ± 23.01) as compared to control group (514.89 ± 33.61). No occurrence of diarrhea was recorded in probiotics fed to calves. Inclusion of probiotics in the ration of calves significantly increased height at withers, heart girth, abdominal girth and reduced feed cost when compared with the control group.

0401. Shukla, Saraswati; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India) Tiwari, D P; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India) Mondal, B C; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India) Kumar, Anil; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Macro and micro mineral profiles in soil, feedstuffs and blood of cattle and buffaloes in Pithoragarh district of Uttarakhand. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1258-1262 KEYWORDS: Blood. Water buffaloes. Cattle. Feeds. Forage. Mineral nutrients. Soil. Water.

Mineral profiles in soil, water, feeds and fodder and blood serum of cattle and buffaloes in 2 villages each from 2 tehsils of Pithoragarh district (hill region) of Uttarakhand were studied. The macro and micro mineral contents in soils of Pithoragarh district were higher than their respective critical levels except Ca; however, 12.5% samples of soil were also deficient in Cu. The feed ingredients were found low in Ca, P, Mg and Cu, while blood serum of cattle and buffaloes was low in Ca, Cu and Mn contents. All concentrate samples were

found optimum for all minerals but Ca (0.156%) and Cu (7.1 ppm) contents were below their critical levels. The roughages had 0.175% Ca and 6.78 ppm Cu and were below critical levels, while P, Mg, Zn, Fe, Co and Mn contents were above the critical levels. The blood serum P (5.29 mg/dl), Mg (4.22 mg/dl), Zn (1.06 ppm) and Fe (2.76 ppm) concentrations were above the critical levels, whereas serum Ca (4.33 mg/dl), Cu (0.34 ppm) and Mn (0.18 ppm) concentrations were below their respective critical levels. Present investigation indicates the critical deficiency of Ca and Cu and slight deficiency of Mn in the animals of this region. Thus there is a need of dietary supplementation of these minerals as area-specific mineral mixture for improving the productive and reproductive efficiency of animals of this region.

0402. Singh, B; Indian Veterinary Research Institute, Izatnagar (India) Prasad, Shive; Indian Veterinary Research Institute, Izatnagar (India). A model based assessment of economic losses due to some important diseases in sheep in India. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1265-1268 KEYWORDS: Death. Losses. Mathematical models. Sheep.

A simple mathematical model has been formulated to assess losses due to diseases in sheep in India. The secondary data of 15 years (1991–2005) taken from Annual Reports of Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India were used for the study. Year-wise number of incidence and deaths were estimated with respect to diseases, viz. FMD, anthrax, sheep- and goatpox, facioliasis enterotoxaemia, PPR and bluetongue. The numerical results reveal that bluetongue accounted for maximum incidence and deaths followed by PPR. Taken together, these diseases accounted about 77.1% of the total economic losses due to all diseases in sheep in India. The total annual average economic loss in sheep was Rs 492.17 lakh. The annual loss was maximum in the year 2005 (2606.96 lakh) and minimum in the year 2002 (Rs 46.29 lakh).

0403. Dixit, V B; Central Institute for Research on Buffaloes. Hisar (India) Bharadwaj, A; Central Institute for Research on Buffaloes. Hisar (India) Sethi, R K; Central Institute for Research on Buffaloes. Hisar (India) Gupta, R; Central Institute for Research on Buffaloes. Hisar (India). Rural environment vis-à-vis buffalo husbandry: Assessment of perceptions of scientists and veterinary surgeons. Indian Journal of Animal Sciences (India). (Dec 2009) v.79(12) p.1273-1276 KEYWORDS: Water buffaloes. Animal husbandry. Senses. Rural environment.

Scientists perceived problems like zoonotic diseases, unclean water of village pond, improper disease management etc as most serious while veterinary surgeons considered problems like cats and dogs picking up infection by eating infected carcass and improper disposal of aborted fetus. Regular interface between veterinary surgeons, scientists and selected farmers may be arranged on environmental problems, both at district and state levels to share their experiences to have further clarifications regarding emerging issues like methane emissions, global warming etc. through animal husbandry. It would, thus, ensure better understanding and appreciation of environmental problems by the animal scientists and veterinary surgeons. Farmers may also be educated on effect of buffalo husbandry on rural environment.

0404. Savi J,; CCS Haryana Agricultural University, Hisar (India) Minakshi P.; CCS Haryana Agricultural University, Hisar (India) Prasad G.; CCS Haryana Agricultural University, Hisar (India). Genotyping of field strains of canine parvovirus in Haryana using PCR and RFLP. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.971–973 KEYWORDS: Canine parvovirus. Enteritis. PCR. RFLP.

Canine parvovirus (CPV) is the causative agent of enteritis and myocarditis in young pups. Since there was no earlier report on the prevalence of CPV in Haryana, the present study was undertaken. The 50 canine parvovirus suspected faecal samples collected from veterinary hospitals were subjected to VP2 gene based PCR. Of these 33 (66%) were positive for canine parvovirus in Haryana. To characterise the canine parvovirus positive samples, PCR-RFLP was done using *Rsa*I. The PCR-RFLP indicated that all the field virus strains detected in our study were either CPV-2a or CPV-2b type which differed from vaccine strain (CPV-2) currently

in use. It demonstrated the potential application of RFLP to differentiate the CPV-2 antigenic variants. The presence of CPV even in vaccinated dogs, possibly suggests the vaccination failure.

0405. Barman, N N; Assam Agricultural University, Guwahati (India) Gupt, R S; Assam Agricultural University, Guwahati (India) Singh, N K; Assam Agricultural University, Guwahati (India) Tiwari, A K; Assam Agricultural University, Guwahati (India) Singh, R K; Assam Agricultural University, Guwahati (India) Das, S K; Assam Agricultural University, Guwahati (India). Comparative evaluation of molecular and antibody based technique for detection of classical swine fever virus infecting pigs of NE Region, India. *Indian Journal of Animal Sciences* (India). (Oct 2009) v.79(10) p.974–977 KEYWORDS: Swine fever. Swine fever virus. Immune response. Swine. In the present study a comparative evaluation was made between antibody-based and nucleic-acid based technique for detection of CSFV. Field tissue and leukocyte samples (120) were collected from CSF suspected outbreaks. The tests showed 64.16% positive in direct FAT, 58.33% in S-ELISA and 75.83% in nested RT-PCR. The viral RNA as well as antigen was mostly detected in the extract of tonsil and mesenteric lymphnodes followed by kidney, spleen, ileum and leucocytes. The study indicated that molecular based technique using E2 specific primer could specifically detect CSFV genome and in higher percentage comparing the polyclonal antibody based techniques like direct FAT and S-ELISA.

0406. Rayulu, V C; CCS Haryana Agricultural University, Regional Research Station, Karnal (India) Chaudhri, S S; CCS Haryana Agricultural University, Regional Research Station, Karnal (India) Singh, A; CCS Haryana Agricultural University, Regional Research Station, Karnal (India). Evaluation of parasitological and monoclonal antibody based assays in detection of *Trypanosoma evansi* infection in animals. *Indian Journal of Animal Sciences* (India). (Oct 2009) v.79(10) p.978–981 KEYWORDS: trypanosoma evansi. Monoclonal antibodies. Elisa.

Blood samples from naturally infected, suspected and healthy cattle (826), buffaloes (285), equines (395) and camels (32) from different places of Haryana were collected and examined for the detection of *Trypanosoma evansi* infection with parasitological tests (wet blood film, WBF; microhaematocrit technique, MHCT) and monoclonal antibody based antigen detection assays (Enzyme linked assays, Ag-ELISA; latex agglutination test, Ag-LAT). *Trypanosoma evansi* infection was detected in 3.0 and 6.1%, 0.7 and 1.1%, and 2.8 and 3.0% cattle, buffaloes and equines with WBF and MHCT, respectively. The camels (32) examined during the period of study were found negative for *T. evansi* infection with WBF and MHCT. Species-wise, *T. evansi* antigens were detected in 50.73 and 40.92% cattle, 37.19 and 30.18% buffaloes, 31.90 and 27.85% equines and 12.5% camels with Ag-LAT and Ag-ELISA, respectively. Latex agglutination proved more sensitive than the ELISA. The former assay also detected 50 positive out of 53 MHCT positive bovine samples in comparison to 46 detected by ELISA. The screening of MHCT positive bovine serum samples (35) with CIC-ELISA detected *T. evansi* immune complexes in 34 whereas Ag detection ELISA failed to reveal *T. evansi* antigens in 7 MHCT positive samples. These observations made it clear that CIC-ELISA is a better option than indirect Ag-ELISA and Ag-LAT is a rapid and field applicable test to arrive at a decision to undertake chemotherapeutic measures in surra-suspected animals.

0407. Garg, Rajat; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, (India) Yadav, C L; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, (India). Diagnosis of benzimidazole resistance in *Haemonchus contortus* using allele-specific PCR technique. *Indian Journal of Animal Sciences* (India). (Oct 2009) v.79(10) p.982–985 KEYWORDS: Genes. PCR. Benzimidazoles. *Haemonchus contortus*. *Haemonchus*.

Molecular tools can be of great use in understanding the origin and nature of underlying mechanisms of benzimidazole resistance. In the present study an allele-specific PCR was standardized to diagnose the mutation (Phe to Try) at residue 200 of the isotype 1 beta tubulin gene responsible for benzimidazole resistance in *Haemonchus contortus* adult and infective larvae. Once standardized, AS-PCR proved to be a powerful tool to detect point mutations at codon 200 of isotype 1 β -tubulin gene of *H. contortus* adult worms

and infective larvae. The technique can be effectively used for genotyping of benzimidazole susceptible and resistant alleles of *H. contortus* from sheep.

0408. Saritha Krishna; Kerala Agricultural University Mannuthy, Kerala (India)P T A Usha; Kerala Agricultural University Mannuthy, Kerala (India). Hypoglycaemic effect of a combination of *Pleurotus ostreatus*, *Murraya koenigii* and *Aegle marmelos* in diabetic rats. *Indian Journal of Animal Sciences* (India). (Oct 2009) v.79(10) p.986–987 KEYWORDS: Hypoglycaemia. *Pleurotus ostreatus*. *Pleurotus*. *Murraya koenigii*. *Murraya*. *Aegle marmelos*.

This study was conducted to assess the hypoglycaemic effect of a combination of *Pleurotus ostreatus*, *Murraya koenigii* and *Aegle marmelos* in alloxan induced diabetic rats. A combination of *P. ostreatus* (250 mg/kg), *M. koenigii* (250 mg/kg) and *A. marmelos* (250 mg/kg) was administered orally to diabetic rats and the effects were compared with individual plant extracts. The study revealed that the combination produced synergistic effects on lowering of blood glucose levels, serum cholesterol and triglyceride levels when compared to individual plant extracts. The effect of the combination was comparable to the reference drug glibenclamide.

0409. Kavitha, K Lakshmi; Department of Veterinary Microbiology, College of Veterinary Science, Tirupati (India)Chetty, M Satyanarayana; Department of Veterinary Microbiology, College of Veterinary Science, Tirupati (India). Efficacy of inactivated and live attenuated goatpox vaccines. *Indian Journal of Animal Sciences* (India). (Oct 2009) v.79(10) p.1018–1019 KEYWORDS: Live vaccines. *Capripoxvirus*. Vaccines.

Vaccination of goats against goat pox is very much essential. In this connection an inactivated and live attenuated vaccine was prepared and was given experimentally to the goats at the dose rate of 4 ml(1x10⁶/ml) subcutaneously and 1000TCID₅₀/ml intradermally respectively, to know about its efficacy to protect goat pox and was challenge on 28th day which resulted an fool proof protection with both the vaccines where as the control group exhibited clinical signs.

0410. Sharma, Anshu; CCS Haryana Agricultural University, Hisar (India)Sindhu, Neelesh; CCS Haryana Agricultural University, Hisar (India)Jain, V K; CCS Haryana Agricultural University, Hisar (India) . 16S–23S rRNA intergenic spacer based molecular detection of *Staphylococcus aureus* directly from mastitic milk of crossbred cows. *Indian Journal of Animal Sciences* (India). (Apr 2009) v.79(4) p.350–352 KEYWORDS: Mastitis. *Staphylococcus aureus*. *Staphylococcus*. Cows. Milk. PCR.

The aim of the present study was to optimize 16S to 23SrRNA intergenic spacer based polymerase chain reaction assay (PCR) to detect *Staphylococcus aureus* directly from mastitic milk of crossbred cows. Amplified product size of 401 bp as well as that of 401bp and 511 bp in some samples was obtained using optimum concentration of magnesium ions, primers, Taq DNA polymerase and annealing temperature. Out of 730 milk samples, 101 milk samples (13.83%) were characterized as *Staphylococcus aureus* by bacteriological examination and other biochemical tests while PCR assay was able to detect 114 (15.61%) samples. None of the culturally positive milk sample was found negative by PCR based on 16S–23S rRNA interspacer region. The assay could detect organisms even when they are not viable due to antibiotic therapy. Molecular detection of *Staphylococcus aureus* by PCR assay was rapid, sensitive and specific, and can be used for screening large dairy herd for early and faster detection; thereby establishment of effective preventive measures reducing economic losses.

0411. Mohan, N. H.; Narendra Dev University of Agriculture and Technology, Faizabad (India)Niyogi, Debasish; Narendra Dev University of Agriculture and Technology, Faizabad (India)Singh, H. N.; Narendra Dev University of Agriculture and Technology, Faizabad (India). Analysis of relationship between Q-T and R-R interval in the electrocardiogram of goats. *Indian Journal of Animal Sciences* (India). (Apr 2009) v.79(4) p.362–365 KEYWORDS: Electrocardiography. Goats.

To theoretically assure the complete electrical recovery of ventricular myocardium from one cardiac cycle before the next cycle begins the QT interval is corrected (QTc, corrected QT) with heart rate (HR). The present study was conducted to analyze the relationship between QT values and HR and utility of different formulae for QT correction. The study also describes QT interval index and QT dispersion in normal goats. Electrocardiographic data was obtained from 16 apparently healthy female goats. Corrected QT interval (QTc) was calculated as per Bazett's formula, Friderica's formula, by a linear formula ($QTc=QT+0.154(1-RR)$) and by optimization ($QTc=QT/RR^{0.299}$) and a modified Bazett's formula ($QTc=QT/(RR)^{0.6}$). The correlation studies (linear and polynomial-second degree) were made between QT and QTc calculated using different formulae. Among the various formulae for correction of QT interval the lowest correlation with RR was obtained by application of Bazett's formula. The linear correlations were in the following descending order the Bazett's modification> Bazett> Fridericia> Andrassy et al. >Sagie et al.> uncorrected QT-RR. The mean QT dispersion and QT interval index were 0.075 ± 0.007 (range, 0.025 to 0.14) and 0.037 ± 0.001 (0.032 to 0.056) respectively. The Bazett's correction with a slight modification theoretically reduced the influence of heart rate on QT interval. The QT dispersion and interval index was higher in goats than those reported for human subjects, suggesting more variability of the myocardium. However, further studies with a large cohort of animals are needed to analyze QT variation and its implication in wide-ranging clinical situations.

0412. Mohan N H; National Research Centre on Pig, Guwahati (India) Tamuli, M K; National Research Centre on Pig, Guwahati (India) Das, Anubrata; National Research Centre on Pig, Guwahati (India). Augmented unipolar lead based formula for calculation of mean electrical axis of the heart. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.366–368 KEYWORDS: Electrocardiography. Heart.

The present study was conducted to derive a mathematical formula for the calculation of MEA from net voltages of QRS complexes in the all the augmented unipolar extremity leads- aVF, aVL and aVR. θ the angle subtended by the lead I of the electrocardiogram of the MEA was equal to $\text{Arctan} \sqrt{3(aVF)/(aVL-aVR)}$. The MEA values calculated using the proposed formula was compared with MEA angles determined using different formulae as well as by dropping perpendiculars in the Einthoven's triangle. With the formula proposed, comparable results were obtained with methods, which accounted for the comparative lead strength of augmented unipolar and bipolar leads of the ECG. The MEA values calculated using various methods were not significantly different. MEA obtained from the augmented leads after applying correction does not differ significantly from the values without correction and for all practical purposes; any of the methods may be used for computation of MEA. However, since the ECG machines can act as source of error, that various methods for calculation of MEA must be analysed under large sample size before being put into use in ECG machines.

0413. Mohan N H; Narendra Dev University of Agriculture and Technology, Kumarganj (India) Niyogi, Debasish; Narendra Dev University of Agriculture and Technology, Kumarganj (India) Waghaye, J Y; Narendra Dev University of Agriculture and Technology, Kumarganj (India) Singh, H N; Narendra Dev University of Agriculture and Technology, Kumarganj (India). Age-related haematological changes in Murrah buffalo (*Bubalus bubalis*) calves. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.369–371 KEYWORDS: Age. Water buffaloes. Erythrocytes. Blood.

The present study was conducted to assess haematological changes in Murrah buffalo calves (*Bubalus bubalis*). The haematological analysis was conducted in female calves ($n=7/\text{group}$) and the animals aged 30 ± 3 , 60 ± 2 , 90 ± 2 , 120 ± 2 , 150 ± 3 , 180 ± 3 , 210 ± 3 , 240 ± 2 , 270 ± 2 , 300 ± 2 , 330 ± 2 and 360 ± 4 days formed groups 1 to 12 respectively. The red blood cell count, hemoglobin and packed cell volume decreased with age. The changes in erythrocytic indices with respect to age were nonsignificant. The total leukocyte count did not vary among the various age groups but significant changes were observed in the differential leukocyte count. The granulocyte: granulocyte ratio steadily declined from 2.03:1 at 1 month of age to 0.48:1 by 12th month of age. Our results indicated significant hematological changes in the buffalo calves with advancement of age, which may be due to increased physiological destruction of red blood cells, maturational changes of lymphoid organs or environment induced adaptive changes with increasing age.

0414. Kumar, Atul; Indian Veterinary Research Institute, Izatangar (India)Sinha, D.K.; Indian Veterinary Research Institute, Izatangar (India)Chaudhury, P.; Indian Veterinary Research Institute, Izatangar (India)Hari Shankar; Indian Veterinary Research Institute, Izatangar (India)Srivastava, S.K.; Indian Veterinary Research Institute, Izatangar (India). Comparative studies on seroepidemiology of canine leptospirosis by micro agglutination test (MAT) and recombinant Lip L32 ELISA. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1089–1094 KEYWORDS: Leptospirosis. Dogs. Microscopy. Immunodiagnosis.

Dogs (806) of 17 breeds were examined serologically by microscopic agglutination test (MAT) for the presence of different serovars of *Leptospira* organism. An overall seroprevalence of 7.07% was observed by MAT. Serovar Canicola was the predominant followed by *Icterohaemorrhagiae*, *Australis*, *Autumnalis*, *Tarassovi*, *Ballum* and others. Male dogs were more sero positive (8.31%) than females (5.41%). The highest seropositivity was observed in 3–5 year age group and lowest in under 1 year of age. Breed-wise more number of positive samples were from large sized breed of dogs like Labrador, German shepherd and Doberman. However, Spitz had maximum (26.31%) seroprevalence among all breeds. Sera samples collected from Chennai, Tamil Nadu showed highest seroprevalence (15.21%) with maximum number of serovars (28). The efficacy of recombinant leptospiral lipoprotein 32 (rLipL32) as an antigen was evaluated using enzyme-linked immunosorbent assay (ELISA) for serodiagnosis of canine leptospirosis. A seropositivity of 10.29% was observed. The relative sensitivity and specificity of ELISA as compared to MAT, was calculated as 100 and 96.52%, respectively. The concordance percentage between MAT and ELISA was 96.77, and the kappa statistics showed a substantial amount of agreement between MAT and ELISA. Results suggested that rLipL32 protein antigen based ELISA could be used as a serodiagnostic test for serodiagnosis of canine leptospirosis.

0415. Mehra, Somya; Central Institute for Research on Goats, Makhdoom (India)Rana, Rajneesh; Central Institute for Research on Goats, Makhdoom (India)Mandal, Ajoy; Central Institute for Research on Goats, Makhdoom (India)Kumar, Vijay; Central Institute for Research on Goats, Makhdoom (India)Kumar, Ashok; Central Institute for Research on Goats, Makhdoom (India)Vihan, V S; Central Institute for Research on Goats, Makhdoom (India)Sharma, M C; Central Institute for Research on Goats, Makhdoom (India). Comparative evaluation of antibody response in goats vaccinated with saponin and saponin-al-gel *Mycoplasma mycoides* subsp *capri* vaccines by enzyme linked immunosorbent assay. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1127–1129 KEYWORDS: Goats. Vaccination. Saponins. *Mycoplasma mycoides*. *Mycoplasma*. Enzymes. Immune response.

In the present study a comparative evaluation was made of antibody response in goats vaccinated with saponin and saponin al-gel *Mycoplasma mycoides* subsp *capri* vaccines by ELISA. The inference can be made with the study that vaccine B (saponin–al-gel) is found to be a superior candidate in raising significantly higher antibody titre in goats as comparison to vaccine A (saponin), although the protein concentration of Mmc antigen in both the preparation was 1.5 mg/dose.

0416. Dutta, T.K.; Central Agricultural University, Mizoram (India) Roychoudhury, P.; Central Agricultural University, Mizoram (India) Banik, S.; Central Agricultural University, Mizoram (India). Antimicrobial drug resistance of *Pasteurella multocida* isolated from pigs in North Eastern Hilly region of India. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1130–1131 KEYWORDS: Drug resistance. *Pasteurella multocida*. *Pasteurella*. Swine.

Antimicrobial resistance patterns were studied using 72 *Pasteurella multocida* isolated from swines in North Eastern Hilly (NEH) region of India against 13 commonly used antimicrobial drugs. All the 72 isolates exhibited complete resistance against sulfadiazine. The calculated resistance pattern revealed that organisms were most sensitive to gentamicin followed by lincomycin, ampicillin, oxytetracyclin, nitrofurantoin and co-trimoxazole but none of the drugs exhibited 100% sensitivity. The resistance percentage against amikacin, streptomycin, spectinomycin, penicillin-G and vancomycin was more than 70% and considered to be non-effective against animal pasteurellosis.

L72 Pests of Animals

0417. B.R. Ravikumar, Bhagwat, V.G., and Mitra S. K. (Veterinary Hospital, Saraswathipuram, Mahalaxmi Layout, Bangalore (India)). Scavon Vet Spray for the treatment of Demodectic Mange in Calf. *Veterinary World (India)* (Feb 2009) V.2(2) p. 65

SCAVON VET spray, a polyherbal preparation from The Himalaya Drug Company, Bangalore, India, was found to be very effective in treating demodectic mange in calf. The product was found to be very convenient for use in field conditions, did not stain the affected area and also, did not cause any adverse reaction locally or systemically.

L73 Animal Diseases

0418. Shankar B.P. (Karnataka Veterinary, Animal and Fisheries Science University Veterinary College, Hebbal, Bangalore (India) Department of Veterinary Pathology). Advances in Diagnosis of Rabies. *Veterinary World (Feb 2009)* V.2(2) p. 74-78. Keywords: Rabies, Zoonosis, Diagnosis, ELISA, CNS, DNA, Virus

Rabies is a major zoonosis for which diagnostic techniques have been standardised internationally. Laboratory techniques are preferably conducted on central nervous system (CNS) tissue removed from the cranium. Agent identification is preferably done using the fluorescent antibody test. A drop of purified immunoglobulin previously conjugated with fluorescein isothiocyanate is added to an acetone-fixed brain tissue smear, preferably made from several parts of the brain, including the hippocampus, cerebellum and medulla oblongata. For a large number of samples, as in an epidemiological survey, the immunoenzyme technique can provide rapid results (the rapid rabies enzyme immunodiagnosis). FAT provides a reliable diagnosis in 98-100% of cases for all genotypes if a potent conjugate is used, while RREID detects only genotype 1 virus. Infected neuronal cells have been demonstrated by histological tests and these procedures will reveal aggregates of viral material (the Negri bodies) in the cytoplasm of neurones. However, the sensitivity of histological techniques is much less than that of immunological methods, especially if there has been some autolysis of the specimen. Consequently, histological techniques can no longer be recommended. As a single negative test on fresh material does not rule out the possibility of infection, inoculation tests, or other tests, should be carried out simultaneously. Newborn or 3-4-week-old mice are inoculated intracerebrally with a pool of several CNS tissues, including the brain stem, and then kept under observation for 28 days. For any mouse that dies between 5 and 28 days, the cause of death should be confirmed by FAT. Alternatively, a monolayer culture of susceptible cells is inoculated with the same material as used for mice. FAT carried out after appropriate incubation will demonstrate the presence or absence of viral antigen. Wherever possible, virus isolation in cell culture should replace mouse inoculation tests. The identification of the agent can be supplemented in specialised laboratories by identifying any variant virus strains through the use of monoclonal antibodies, specific nucleic acid probes, or the polymerase chain reaction followed by DNA sequencing of genomic areas. Such techniques can distinguish between field and vaccine strains, and possibly identify the geographical origin of the field strains. Virus neutralisation assays in cell cultures are the prescribed tests for international trade.

0419. Selvam, A; Tamil Nadu Veterinary and Animal Sciences University, Department of Veterinary Epidemiology and Preventive Medicine, Chennai (India)Vijayarani, K; Tamil Nadu Veterinary and Animal Sciences University, Department of Animal Biotechnology. Chennai (India)Kumanan, K; Madras Veterinary College, Department of Animal Biotechnology, Chennai (India). Detection of Mycobacterium avium subsp paratuberculosis in milk of asymptomatic sheep by polymerase chain reaction. *Indian Journal of Animal Sciences (India)*. (Aug 2009) v.79(8) p.784-785 KEYWORDS: Diagnosis. PCR. Mycobacterium avium subsp. Paratuberculosis. Paratuberculosis.

Nucleic acid detection methods are used for rapid diagnosis of Johne's disease. In this study, 50 milk samples were collected from an organized sheep farm in Tamil Nadu. DNA was isolated from milk samples and screened for MAP by IS900 PCR, nested IS900 PCR and F57 PCR. Out of 50 samples, 38 were positive by IS900 PCR, 37 were positive by nested IS900 PCR and 8 were positive by F57 PCR. Of the 3 sets of primers employed, IS900 primers were very sensitive and specific for the detection of MAP in sheep milk samples.

0420. Katre, D D; Maharashtra Animal Fishery Sciences University, Nagpur (India)Zade, N N; Maharashtra Animal Fishery Sciences University, Nagpur (India)Shinde, S V; Maharashtra Animal Fishery Sciences University, Nagpur (India)Jaulkar, A D; Maharashtra Animal Fishery Sciences University, Nagpur (India)Khan, W A; Maharashtra Animal Fishery Sciences University, Nagpur (India)Chaudhari, S P; Maharashtra Animal Fishery Sciences University, Nagpur (India). Plasmid profile study of *Listeria* isolates from foods of animal origin. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.855–857 KEYWORDS: *Listeria*. Plasmids.

Nine isolates of *Listeria* species from the foods of animal origin were processed for plasmid profile studies, using the techniques of alkaline lysis and agarose gel electrophoresis. Of the 9 isolates, 8 harboured 1 to 2 plasmid fragments of varying molecular weight. The molecular weight of plasmid fragments was between 16148.78 bp and 698.00 bp; for *L. murrayi*; for *L. grayi* it was between 14261.73 bp and 10070.78 bp. *L. ivanovii* and *L. innocua* revealed single plasmid of molecular weight 10584.01 bp and 9171.78 bp respectively. Our findings indicate that plasmid profile is a valuable epidemiological tool in differentiating the strains with different sources of origin.

0421. Boral, Rupa; Indian Veterinary Research Institute, Izatnagar (India)Singh, Maninder; Indian Veterinary Research Institute, Izatnagar (India)Singh, D K; Indian Veterinary Research Institute, Izatnagar (India). Status and strategies for control of brucellosis—A review. *Indian Journal of Animal Sciences (India)*. (Dec 2009) v.79(12) p.1191–1199 KEYWORDS: Brucellosis. Control methods. Zoonoses.

Ever since the discovery of the causative agent more than a century back, brucellosis remains one of the most important and widespread zoonosis all over the world. Recently, it has been described as re-emerging zoonoses. The disease is endemic in many parts of the world including India in both animals and humans causing significant morbidity and economic losses. However, the exact epidemiology and distribution of the disease is unknown. *Brucella melitensis* is the most common cause of human infection. The recent isolation of distinct strains of *Brucella* from marine mammals as well as humans is an indicator of an ever expanding epidemiology of disease. Animal brucellosis is being controlled through vaccines and management. A safe and effective vaccine in humans is not yet available and prevention is dependent upon the control of disease in animal hosts. The status of brucellosis and strategies for its control, particularly in developing countries, is discussed.

0422. Vanamayya, P R; High Security Animal Disease Laboratory, Indian Veterinary Research Institute. Bhopal (India)Pattnaik, B; High Security Animal Disease Laboratory, Indian Veterinary Research Institute. Bhopal (India)Pateriya, A K; High Security Animal Disease Laboratory, Indian Veterinary Research Institute. Bhopal (India) Desai, G S; High Security Animal Disease Laboratory, Indian Veterinary Research Institute. Bhopal (India)Rajukumar, K; High Security Animal Disease Laboratory, Indian Veterinary Research Institute. Bhopal (India). Genomic detection methods for detection of pseudorabies virus infection in Indian pigs. *Indian Journal of Animal Sciences (India)*. (Dec 2009) v.79(12) p.1200-1204 KEYWORDS: Swine. Aujeszky virus. PCR.

Pseudorabies disease is an alpha-herpes virus infection that causes significant economic losses due to piglet mortality, respiratory disease in feeder pigs and reproductive losses in breeding age swine. Latency is an integral part of the ecology of herpes viruses and reactivation of latent pseudorabies virus (PRV) genome results in renewed replication and potential transmission to susceptible pigs. In India, the status of the disease is not clear except for 2 isolated reports in early 70's. Peripheral blood lymphocytes (PBLs), tonsil and brain tissues collected at slaughter and nasal swabs from Indian native pigs with respiratory illness were processed for PRV genomic detection by PCR using different sets of specific primers. All the samples were

negative for the presence of PRV genomic sequences. Total DNA samples extracted from these samples were also confirmed to be negative by Southern hybridization using a P32-dATP labeled PRV gII region specific probes. Attempts to isolate the virus in PK-15 and IBRS-2 cell-lines were unsuccessful. SYBR green real-time PCR was developed using a PRV reference clone. The conserved region, glycoprotein gII (gB), of PRV of the clone was targeted with specific primers to amplify 318 bp product. The minimum detection limit estimated using varying dilutions of standard reference clone (10⁻¹ to 10⁻¹⁵) was 1.4 to 14 copies per reaction. In the present study, no pseudorabies virus genome could be detected in the tissue/nasal swab samples screened from Indian native pigs even by real-time PCR assay, that can detect as few as 14 copies of PRV genomic sequences.

0423. Malik, Praveen; National Research Centre on Equines, Hisar (India)Khurana, S K; National Research Centre on Equines, Hisar (India)Singh, B K; National Research Centre on Equines, Hisar (India) Dwivedi, S K; National Research Centre on Equines, Hisar (India). Recent outbreak of glanders in India. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1015-1017 KEYWORDS: pseudomonas cepacia. Complement fixation tests. Bacterioses. Epidemics.

Glanders, a notifiable highly contagious zoonotic disease primarily of equids, is caused by *Burkholderia mallei*. The disease in India was restricted to certain pockets with sporadic cases. A major outbreak of glanders occurred in India starting in 2006 from Maharashtra (26 cases). The disease has been reported later on from six other states namely Uttar Pradesh (70), Uttrakhand (21), Punjab (3), Andhra Pradesh (16), Himachal Pradesh (6) and Haryana (1) till 2007. The disease was confirmed among equines based on clinical signs and symptoms, microbiological and serological investigations. A total of 14 isolates indistinguishable from *B. mallei* were obtained from clinical samples while serum samples of 140 equines were found positive by Complement Fixation Test. Strategies for containment of the disease to other areas and action as per Glanders and Farcy Act, 1899 were suggested. Follow up revealed negative status in various states indicating that the disease was successfully contained in the country.

0424. Kalaiselvan, A; Indian Veterinary Research Institute, Izatnagar (India)Pawde, A M; Indian Veterinary Research Institute, Izatnagar (India)P Kinjavdekar3,; Indian Veterinary Research Institute, Izatnagar (India)Amarpal; Indian Veterinary Research Institute, Izatnagar (India)Aithal, H P; Indian Veterinary Research Institute, Izatnagar (India)Gupta, O P; Indian Veterinary Research Institute, Izatnagar (India). Occurrence of ocular affections in domestic animals. Indian Journal of Animal Sciences (India). (Oct 2009) v.79(10) p.1020-1021

The occurrence of ocular affections was recorded from 2000 to 2005 for species, breed, age, sex, season and condition wise in different species of domestic animals. Canine was the most affected species followed by equine. Maximum occurrence was recorded in Spitz dogs followed by non-descript breed. All the age groups and both sexes in different species were affected. The cases were distributed throughout the year. Traumatic injuries to the eye constituted the major portion of the affections followed by corneal opacity, ocular worms and conjunctivitis.

0425. Barman, P; Indian Veterinary Research Institute, Izatnagar (India)Yadav, M C; Indian Veterinary Research Institute, Izatnagar (India)Kumar, H; Indian Veterinary Research Institute, Izatnagar (India)Meur, S K; Indian Veterinary Research Institute, Izatnagar (India)Rawat, M; Indian Veterinary Research Institute, Izatnagar (India). Antibacterial efficacy of neem oil fractions on clinical isolates of endometritic cows. Indian Journal of Animal Sciences (India). (Jul 2009) v.79(7) p.665-668 KEYWORDS: bactericides. Cows. Endometritis. Neem extracts.

The objective of this study was to assess in vitro antibacterial activity of neem oil (*Azadirachta indica*) and its fractions and neem seed aqueous extract on microflora of cervico-vaginal mucus (CVM) collected from cows with endometritis. The CVM samples were obtained from 12 cows during 40-50 days postpartum and were subjected to bacterial isolation and identification. Neem oil was fractionated by 2 approaches, viz, by solvent

extraction and by column chromatography using a silica gel column. Neem seed aqueous extract was prepared from dried neem seeds. Isolates (20) were identified, comprising mostly facultative anaerobic bacteria. Non-lactose fermenting (NLF) bacteria belonging to Enterobacteriaceae family was the most frequently isolated bacteria (25%) followed by *Escherichia coli* (20%), *Corynebacterium* sp. and *Streptococcus* sp. (15% each). Extraction of neem oil with organic solvents, viz. methanol and hexane yielded 4 fractions, which were termed methanol miscible (F1), methanol-immiscible emulsion (F2), hexane miscible (F3) and hexane-immiscible emulsion (F4). Column chromatography yielded 3 fractions, viz. F5 (first fraction), F6 (second fraction) and F7 (third fraction). The F1 (methanolic) fraction showed the highest antibacterial activity with a sensitivity pattern of 95% followed by F2 and F3 (85% each), F4 (65%), F6 and F7 (40% each). Moreover, the neem seed aqueous extract did not possess any antibacterial activity.

0426. Chachra, Deepti; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India)Jan, S K; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India)Arora, A K; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India)Rai, T S; Guru Angad Dey Veterinary and Animal Sciences University, Ludhiana (India). Serum susceptibility profiles of *Pasteurella multocida* B: 2 isolates. *Indian Journal of Animal Sciences* (India). (Jul 2009) v.79(7) p.675-676 KEYWORDS: *Pasteurella multocida*. Pathogenicity.

Survivability of bacteria in serum is considered a likely virulence determinant in diseases where the infective bacteria become septicaemic. Ten out of 13 (77%) *P. multocida* B: 2 isolates were resistant to killing in serum; rather they were multiplying in the serum, thus confirming that these are fastidious organisms.

0427. Kumar, Harendra; Indian Veterinary Research Institute, Izatnagar (India)Bhooshan, Neeru; Indian Veterinary Research Institute, Izatnagar (India)Barman, P; Indian Veterinary Research Institute, Izatnagar (India)Yadav, M C; Indian Veterinary Research Institute, Izatnagar (India). Administration of herbal antimicrobials recovers the endometritis in buffaloes. *Indian Journal of Animal Sciences* (India). (Jul 2009) v.79(7) p.679-680 KEYWORDS: Water buffaloes. Endometritis. Antimicrobials. Neem extracts.

The efficacy of garlic extract and neem oil in recovery of sixty buffaloes from endometritis was evaluated. The clinical recovery was assessed by negative whiteside test reaction, significant decline in pH and bacterial load in CVM at subsequent estrus. The garlic extract and neem oil each recovered 80% buffaloes from uterine infections and the conception rate were 75 and 67%, respectively. These results indicate that garlic extract and neem oil may be used as an alternative therapy to antibiotics in endometritic cases.

0428. Siddique, R. A.; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India)Saxena, M; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India) Lakhchaura, B D; Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (India). Molecular typing of Indian *Salmonella* isolates from poultry samples. *Indian Journal of Animal Sciences* (India). (Apr 2009) v.79(4) p.353-357 KEYWORDS: RAPD. PCR. *Salmonella*. Poultry.

Genus *Salmonella* consists of an important zoonotic, ubiquitous, organisms causing disease in human as well as animals. In the present study molecular typing of Indian *Salmonella* isolates, 300 poultry samples (fecal, meat and egg) were screened for *Salmonella*. Rapidly detected by targeting *invA* gene, giving PCR product of 284 bp size. Positive samples of *Salmonella* were serotyped. Five RAPD primers were used to generate randomly amplified polymorphic DNA fragments. RAPD of 24 *Salmonella* isolates by all 5 primers generated 122 loci. Out of which, 18 were unique and 104 loci were polymorphic. The size of these fragments ranged from 200 bp to 3.0 Kbp. Dendrogram of RAPD for 24 *Salmonella* isolates revealed similarity between 14.3 to 50. , It is concluded that RAPD technique can be used to demonstrate differences among same serovars of *Salmonella*.

0429. Vijayarani, K; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Nagalakshmi, K Shrine; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India)Malathi, G.; Tamil Nadu

Veterinary and Animal Sciences University, Chennai (India) Jayathangaraj, M G; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Sathasivam, S; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Kumanan, K; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Leptospirosis in a lion. Indian Journal of Animal Sciences (India). (Apr 2009) v.79(4) p.372-372 KEYWORDS: Leptospira. Lions. PCR.

Leptospirosis in a lioness was studied. Urine and serum samples were used for DNA isolation and polymerase chain reaction. The PCR confirmed the presence of leptospira infection in lioness.

0430. Rajamuthu, S.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Parthiban, M.; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Kumar, T.M.A. Senthil; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Aruni, Wilson; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India) Kumar, S. Senthil; Tamil Nadu Veterinary and Animal Sciences University, Chennai (India). Nucleotide sequence analysis of the viral envelope protein gene (P32) region of sheep poxvirus from India. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1095-1098 KEYWORDS: Nucleotides. Sheep. Viroses. Vaccines.

Seven local field strains of sheep poxvirus from different districts of Tamil Nadu, India and vaccine strains were characterized by sequencing studies to find out the marker gene in an attempt to differentiate the field and vaccine strains. The full length viral envelope protein gene (P32) of sheep poxvirus was amplified and sequenced. The sequence studies revealed that the local field strains possessed 100% and 99.31% homology with Ranipet and Roumanian-Fanar vaccine strains respectively. Sheep poxvirus could not be differentiated based on the envelope protein nucleotide sequence level in any field outbreaks.

L74 Miscellaneous Animal Disorders

0431. Ananda, K. J.; K. Mohan; Ansar Kamran; Sharada, R. (Veterinary College, Bangalore (India). Department of Veterinary Clinical Service Complex). Snake bite in dogs and its successful treatment. Veterinary World (India) (Feb 2009) V.2(2) p. 66-67 Key words: Labrador, Alsatian cross, snake bite, treatment

Abstract Two dog viz. Labrador and Alsatian cross were presented to the peripheral hospital with a history of frothy salivation, dull, depressed, abnormal gait and with recumbent position. They were diagnosed for snake bite based on the history and physical examination. The hematological parameters showed reduced values of hemoglobin, packed cell volume and increased total leukocyte count. The biochemical values showed elevated levels of alanine aminotransferase and creatinine. The successful treatment was done with anti-snake venom, fluid, corticosteroid, muscuranic receptor antagonist and antibiotic with careful monitoring.

0432. K. Mohan; Ananda, K. J.; Shridhar, N. B.; Puttalakshamma, G.C.; Placid E. D'Souza (Veterinary College, Bangalore (India). Department of Pharmacology and Toxicology) Corneal opacity due to *Setaria digitata* in a Jersey cross-bred Cow and its surgical management. Veterinary World (India) (Feb 2009) V.2(2) p. 69-70 Keywords: cows, corneal opacity, *Setaria digitata*, Worm, surgical operations

A Jersey cross bred cow brought to the peripheral hospital, Uttara Kannada with clinical signs of lacrimation, corneal opacity, blephorospasm and presence of white thread like worm in its anterior chamber of the right eye. The worm was surgically removed by limbal incision and an adequate post operative care was taken for early recovery. The worm was morphologically identified as *Setaria digitata*. The cow attains normal sight in 3 weeks postoperatively.

0433. Raut, B.M.; Dhakate, M.S.; Upadhye, S.V.; Khante, G.S.; Tiple, A.V.; Khan, L. A.; Donekar M.N. (Nagpur Veterinary College, Nagpur (India) Department of Animal Reproduction, Gynaecology and Obstetric). Uterine inertia in bitch. Veterinary World (India) (Feb 2009) V.2(2) p. 71 Uterine inertia that is lack of normal

physiologic uterine contraction during or after parturition, is a common condition encountered in bovine. However, it is comparatively less reported in canine. Primary inertia is due to a hormonal dysfunction.

0434. Panda, Debasis; Indian Veterinary Research Institute, Izatnagar (India)Patra, R C; Indian Veterinary Research Institute, Izatnagar (India)Nandi, S; Indian Veterinary Research Institute, Izatnagar (India)Swarup, D; Indian Veterinary Research Institute, Izatnagar (India). Antigenic characterization of canine parvovirus by polymerase chain reaction. *Indian Journal of Animal Sciences (India)*. (Sep 2009) v.79(9) p.876–879
KEYWORDS: Antigens. Canine parvovirus. Pathogens. Diarrhoea. Dogs. PCR.

The present study was aimed at antigenic characterization of canine parvovirus DNA extracted from faecal samples of dogs. A significant proportion (11.93%) of the total canine cases presented had clinical signs of diarrhoea. Faecal samples were collected from 56 dogs with clinical signs of vomiting and diarrhoea. Three different sets of primers were used with 5 different pre-treatment combinations to remove the inhibitory substances in the faecal samples to amplify CPV-2, CPV-2b or CPV-2ab gene. Use of DNA extracted from purified faecal material by phenol-chloroform extraction method after proteinase K or boiling, as template in PCR assay produced maximum number (n=33) of positive cases for CPV. Out of 56 cases studied, 3 samples were positive with primer pair CPV-2 and 30 were positive with primer pair CPV-2ab, and out of which 27 were positive for CPV-2b. It is concluded that CPV-2b is the major antigenic type prevalent in this region in addition to a smaller proportion of CPV-2a and CPV-2 circulating in field condition.

0435. Kumar, R Suresh; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Verma, H K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Umapathi, L; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India) Gandotra, V K; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India)Kasrija, Rajesh; Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (India). Plasma Estradiol concentrations during parturition vaginal prolapse in buffaloes. *Indian Journal of Animal Sciences (India)*. (Oct 2009) v.79(10) p.1001–1003
KEYWORDS: Water buffaloes. Oestrogens. Vaginal diseases.

Blood samples were collected from 15 buffaloes having parturition prolapse of vagina before (Group 1) and after treatment (Group 2) and from five normal pregnant (Group 3) buffaloes to study the estrogen as a possible cause of prolapse. In Group 3, the estradiol concentration remained almost constant during sixth to nine month of gestation with a gradual increase and during nine and tenth month, it increased steadily and reached a peak value of about 515 pg/ml on the day of calving. There was a significant variation of estradiol before and after treatment with the corresponding stage of normal gestation during 6–8 months, 8–10 months and above 10 months of gestation. It suggests the role of estrogen as a cause of parturition vaginal prolapse.

0436. Singh, B. K.; National Research Centre on Equines, Hisar (India)Virmani, Nitin; National Research Centre on Equines, Hisar (India)Gulati, Baldev R; National Research Centre on Equines, Hisar (India). Assessment of protective immune response of inactivated equine herpesvirus–1 vaccine in pregnant BALB/c mice. *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.345–349
KEYWORDS: Equine arteritis virus. Immune response. Respiratory disorders. Equine herpesvirus.

To assess the immunogenic potential of inactivated equine herpesvirus–1 (EHV–1) vaccine in murine model, female BALB/c mice (group 1) were vaccinated intraperitoneally twice, 21 days apart, while group 2 mice were sham-inoculated and served as control. After immunization, antibodies against EHV–1 were detected on day 14, 21 and 28 day by virus neutralization test and enzyme-linked immunosorbent assay, but there was no significant increase in cell-mediated immune response. After mating and confirming pregnancy, the mice were challenged by intranasal instillation of 107.0 TCID₅₀/25 μ l of EHV–1 virus (Raj–98 strain) at day 14 of gestation. Following challenge, clinical signs, viz. dyspnoea, crouching in corners, vaginal discharge, abortion, and mortality increased significantly in non-vaccinated (group 2) mice with a clinical score of 8.17 as compared to

vaccinated mice, where dyspnoea, crouching in corners and mortality were not observed and clinical score was 2.0 on day 3 post-challenge. After challenge, vaccinated mice showed less number (30%) of abortions as compared to 66.66% in non-vaccinated mice. Reduced virus titre recovery and score for herpesvirus-specific pathology in maternal lungs were observed in vaccinated dams. Indirect immunoperoxidase staining of lung tissues of immunized dam demonstrated less viral antigen than in unimmunized dams. These results confirm that inactivated EHV-1 vaccine afforded good humoral immune response and partial protection in pregnant BALB/c mice.

0437. Mandal, D K; Project Directorate on Cattle. Meerut (India) Kumar, M; Project Directorate on Cattle. Meerut (India) Tyagi, S; Project Directorate on Cattle. Meerut (India). Assessment of sperm morphological abnormalities, livability and plasmallemal integrity in frozen-thawed semen of Sahiwal bulls. *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.358–361 KEYWORDS: Bulls. Semen.

Bull-wise total sperm abnormalities ranged from 11.20 to 26.60. . Among the major sperm abnormalities incidences of deformed/degenerated head, pyriform head, asymmetric contour, segmental aplasia of mitochondrial sheath, double mid piece, proximal protoplasmic droplets, Dag defect, double tail, tail looped over head and stump tail were recorded. Among minor abnormalities incidences of free head, narrow head, abaxial implantation of mid piece, bent, coiled, broken, filiform mid piece, transdroplet, coiled tail, bent tail and distal protoplasmic droplets were observed. Minor abnormalities were predominant over major and on overall basis minor abnormalities were 5-time higher than major. Sahiwal bulls showed significant differences among themselves with respect to post-thaw sperm motility, livability, plasmallemal integrity and incidences of various kinds of sperm abnormalities.

0438. Kumar, Subodh; National Research Centre on Mithun, Nagaland (India) Bhattacharya, H K; National Research Centre on Mithun, Nagaland (India). Abnormal spermatozoa in mithun (*Bos frontalis*). *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.373–374 KEYWORDS: spermatozoa. Semen.

Four mithun (*Bos frontalis*) bulls from Arunachalese, Nagamese, Manipuri and Mizoram strains were subjected to study on morphological profile of spermatozoa from the semen (31 samples) collected by the rectal message method. The head, mid-piece, tail and total abnormalities (which included under developed, double head, decapitated, pear.

0439. Nath, Kashi; Indira Gandhi Krishi Viswa Vidyalaya, Raipur (India) Tiwari, S K; Indira Gandhi Krishi Viswa Vidyalaya, Raipur (India) Raju Sharda; Indira Gandhi Krishi Viswa Vidyalaya, Raipur (India). Prevalence, histopathological features and surgical management of canine cystic endometrial hyperplasia with pyometra in and around Durg district of Chhattisgarh State. *Indian Journal of Animal Sciences (India)*. (Apr 2009) v.79(4) p.377-378 KEYWORDS: Hyperplasia. Pyometra. Histopathology.

The prevalence of pyometra was more in bitches, which were in the age group of 6–9 years (55.55). It was more in smaller breeds than the large breeds. Nulliparous bitches were affected more in comparison to pluriparous bitches. Clinical signs most frequently observed were anorexia, lethargy, polyuria, polydipsia, vomiting and vaginal discharge. The histopathological study revealed inflammatory changes ranging from simple glandular hyperplasia to cystic endometrial hyperplasia. The lumen of endometrial glands were heavily infiltrated with neutrophils, lymphocytes, macrophages and plasma cells.

M01 Fisheries and aquaculture - General aspects

0440. Barman, R C; West Bengal University of Animal and Fishery Science, Kolkata (India) Dana, S S; West Bengal University of Animal and Fishery Science, Kolkata (India). Impact of participation and involvement in decision making on knowledge levels of Beel users for sustainable development of Beel fisheries. *Indian*

Journal of Animal Sciences (India). (Sep 2009) v.79(9) p.952–954 KEYWORDS: Fisheries. Floodplains. Participation. Sustainable development.

The study was conducted to see the impact of two psychological variables on knowledge levels of beel users for sustainable development of beel fisheries. The findings of the study revealed that beel users participation in the development programme and their decision-making ability were significantly and positively associated with their knowledge level. The different levels of these two variables affected significantly on the knowledge levels of beel users for sustainable development of beel fisheries. However between these 2 variables, beel users' participation in beel development programme was the most significantly contributing variable.

0441. Sharma, J.G.; University of Delhi. Delhi (India)Chakrabarti, R.; University of Delhi. Delhi (India). Comparative growth performance and proteolytic enzyme activity of Indian major carp larvae, fed with live food and refrigerated-plankton food. Indian Journal of Animal Sciences (India). (Nov 2009) v.79(11) p.1185–1188 KEYWORDS: Catla. Growth. Plankton.

Indian major carp *Catla catla* (0.79 ± 0.01 mg) larvae were cultured under 2 feeding regimes of live food (LFS) and refrigerated-plankton food (RPFS) in recirculating systems separately for 30 days. Survival of larvae was 18% higher in LFS compared to RPFS. Final average weight was significantly higher in fish fed with live food compared to the refrigerated-plankton fed fish. Specific growth rate was significantly higher in former compared to latter one. RNA/ DNA of catla was nearly two-fold higher in live food fed fish compared to the refrigerated-plankton food fed fish. Food was utilized in a better way in LFS compared to RPFS is evident from the significantly lower value of FCR in the former compared to the latter system. Specific proteolytic activity was significantly higher in LFS (0.82 ± 0.02 mg tyrosine/mg protein/h) compared to RPFS (0.457 ± 0.01 mg tyrosine/mg protein/h). The presence of more digestive enzymes, especially proteolytic enzyme in live food fed catla resulted into the proper digestion of ingested food compared to the fish fed with refrigerated-plankton food. Prevalence of better water quality in terms of significantly lower values of ammonia, nitrite, phosphate and COD in LFS compared to the RPFS was conducive for the better performance of catla in the former feeding scheme. Reduction in nutrient contents like protein and lipid as well as leaching of essential nutrients especially free amino acids from refrigerated-plankton may be responsible for the poor performance of catla larvae in RPFS compared to LFS.

Q54 Feed composition

0442. Kishore, K. Raja; Parthasarathy, M. (Sri Venkateswara Veterinary University, Tirupati (India) College of Veterinary Science. Department of Animal Nutrition). Prediction of Energy Content of Tropical Forages and Tree Leaves Using NRC-2001 (a TDN-based Model) in Ruminants. Animal Nutrition and Feed Technology (India) (Jan 2009) v. 9(1) p 37-44 Keywords: Ruminants, TDN, Tropical forages, Tree leaves, Energy content

An experiment was conducted to predict the TDN content of various tropical forages and tree leaves by the equations of NRC (2001) as given by the summative approach and compare it with the estimated values obtained after digestion trials. Twenty four feedstuffs (8 each of cultivated grasses, leguminous forages and fodder tree leaves) were analysed for their proximate principles, detergent fiber components, ADIN, NDIN and the TDN was then calculated. Gliricidia, Andhra Pradesh Bajra Napier-1 (APBN-1) and groundnut haulms were evaluated as sole feed for total tract digestibility of nutrients and nutritive value using four growing male goats. The TDN (%) obtained by the equations of NRC (2001) for gliricidia (55.4), APBN-1 (60.3) and groundnut haulms (53.3) were in conformity with that of TDN obtained by in vivo studies (53.5, 61.8 and 55.4), respectively. It was concluded that the summative approach provides a rapid, inexpensive and accurate means to calculate the energy density (TDN) of tropical forages and tree leaves.

0443. Kishore, K. Raja; Parthasarathy, M. (Sri Venkateswara Veterinary University, Tirupati (India). College of Veterinary Science. Department of Animal Nutrition). In vitro Nitrogen Degradability of Some Forages, Top

Feeds and Fibrous Crop Residues. *Animal Nutrition and Feed Technology (India)* (Jan 2009) v. 9(1) p 97-102

Keywords: Nitrogen degradability, Forages, Top feeds, Crop residues, In vitro.

The study was conducted to evaluate some forages, top feeds and fibrous crop residues for their total N content and N fractions in vitro based on their solubility in buffer and detergent solutions. The feed samples include eight cultivated grasses, eight leguminous forages, eight top feeds and six fibrous crop residues. Total N content (g/kg DM) for grasses, leguminous forages, top feeds and crop residues was 12.9, 22.0, 30.1 and 7.2, respectively. Potentially digestible N was more than 90 per cent for most of the feedstuffs with the exception of paragrass (88.2%), napier bajra (NB-21) (86.6%), *Cenchrus ciliaris* (86.6%), *gliricidia* (86.9%), rice straw (68.6%), maize straw (77.6%), sorghum straw (82.0%) and finger millet straw (86.3%). It was concluded that dietary N can be partitioned into various fractions based on solubility in buffer and detergent solutions and various feed sources can have wide variation in rumen degradation pattern thus presenting different N fractions at duodenal level. Nitrogen degradability of feedstuffs in vitro is useful to screen various feedstuffs for their utility in ruminant rations.

0444. Datt, Chander; ICAR Research Complex for NEH Region, Tripura (India) Singh, N.P.; ICAR Research Complex for NEH Region, Tripura (India) Chhabra, Aruna; ICAR Research Complex for NEH Region, Tripura (India) Dhiman, K.R.; ICAR Research Complex for NEH Region, Tripura (India). Nutritional evaluation of cultivated fodder crops grown under agro-climate of Tripura. *Indian Journal of Animal Sciences (India)*. (Nov 2009) v.79(11) p.1143–1148 KEYWORDS: Feed crops. Agroclimatic zones. Tripura. Nutrition physiology.

The study was conducted to assess forage yield and nutritional characteristics of various crops including graminaceous (maize, sorghum, pearl millet, oat, napier hybrid, para grass, congo signal, signal grass, guinea grass, thin napier and broom grass) and leguminous (cowpea, rice bean, berseem, cluster bean/guar, soybean, stylo and perennial ground nut) introduced at the ICAR Research Complex, Tripura Centre. The average fresh forage yields of different forage crops were satisfactory and in the range reported elsewhere in the country with the exception of berseem and cluster bean which yielded lesser quantity of herbage. There were significant differences among the crops (graminaceous or leguminous) in terms of proximate principles, cell wall constituents, in vitro DM and OM digestibility (IVDMD and IVOMD) and metabolisable energy (ME) values. Leguminous fodders possessed higher level of CP, EE, IVDMD/ IVOMD and ME compared to graminaceous fodders while a reverse trend was observed for CF and cell wall components except ADL. Overall, CP and EE were positively correlated with IVDMD, IVOMD and ME values, however, CF, NDF, ADF and cellulose showed negative relationship with these parameters. ME value had a strong positive correlation with IVDMD and IVOMD levels in the fodders. Considering their herbage yield under tilla land (upland) conditions, they hold good potential for increasing the forage production and thus bridge the gap between demand and supply of nutrients particularly for ruminants and to raise their productivity in the state.

Q80 Packaging

0445. Wilfred Ruban, S. (Veterinary College, Bangalore (India) Department of Livestock Products Technology) Biobased Packaging - Application in Meat Industry. *Veterinary World (India)* (Feb 2009) V.2(2) p. 79-82. Keywords: Meat Industry, Packaging, Keeping quality, Bio-plastic. Because of growing problems of waste disposal and because petroleum is a nonrenewable resource with diminishing quantities, renewed interest in packaging research is underway to develop and promote the use of "bio-plastics." In general, compared to conventional plastics derived from petroleum, bio-based polymers have more diverse stereochemistry and architecture of side chains which enable research scientists a greater number of opportunities to customize the properties of the final packaging material. The primary challenge facing the food (Meat) industry in producing bio-plastic packaging, currently, is to match the durability of the packaging with product shelf-life. Notable advances in biopolymer production, consumer demand for more environmentally-friendly packaging,

and technologies that allow packaging to do more than just encompass the food are driving new and novel research and developments in the area of packaging for muscle foods.

How to obtain the full text of documents

1. Recommendations to scientists

- First determine whether your local library or another library in your area can provide you with a copy of the document you want.
- Most authors keep small stocks of reprints of their own publications, and they are usually prepared to respond to a polite request from a fellow scientist.
- In addition many of the NARD Input Centers have a document delivery service. Your librarian may write and request a photocopy for which you may often be charged the photocopy and mailing cost.
- If your librarian is unable to find the document you want, you could send us the document delivery coupon which is included in each copy of this journal. This coupon enables you to ask the NARD Headquarter to supply one or two items for your personal interest. We make no charge for this limited service, but the coupons should be used only as a last resort.
- Because of copy right regulations, photocopies of entire publications (e.g. complete books) cannot be provided.

2. Recommendations to librarians

- Become a NARD member early and get your work visible to others.
- Establish good working relationships with other librarians and be as helpful as possible in providing document delivery services from the collection you hold.
- Make your managers aware of the importance of having your own collection effectively organized, with back copies available for document delivery with access to a photocopy machine and some funds to provide requested copies of your documents.
- Contact the NARD Headquarter to make sure that relevant publications of your institution are entered/indexed in NARD.

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DIPA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____ Entry Number _____ Author _____

Title _____

Source _____

Year of Publication of the source/journal _____ Pages _____

Write your name/address on the reverse of this coupon

✕ -----

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DIPA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____ Entry Number _____ Author _____

Title _____

Source _____

Year of Publication of the source/journal _____ Pages _____

Write your name/address on the reverse of this coupon

✕ -----

Document Delivery Coupon

Please use this coupon only as a last resort after having tried to obtain the document you need from your own library or a national or regional information centre/library/NARD Input Centre.

Send your request to: The Information Systems Officer,
Agricultural Research Information Centre, DIPA
Krishi Anusandhan Bhavan, Pusa, New Delhi 110 012
e-mail: hansraj@icar.org.in

Please send me a reprint/photocopy of the following document listed in NARD for the purpose of my personal study or research:

Volume No./Year _____ Entry Number _____ Author _____

Title _____

Source _____

Year of Publication of the source/journal _____ Pages _____

Write your name/address on the reverse of this coupon

My name and institutional address are:

Date: _____

Signature: _____

✕ -----

My name and institutional address are:

Date: _____

Signature: _____

✕ -----

My name and institutional address are:

Date: _____

Signature: _____