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CLINICAL EFFICACY OF SOME HERBAL DRUGS DURING INDIGESTION IN BUFFALOES

Ramesh Kumari and M.A. Akbar

In India, dairy farming plays an important role as the contribution from milk alone stood at Rs. 1,075.44 billion cores during 2002-2003. However, the occurrence of various diseases in dairy animals adversely affects the production and thus leads to financial losses. Hypo-galactia and agalactia are the common conditions in dairy animals suffering from primary indigestion, which can be cured quickly by adopting radical treatment (Singh *et al.*, 1996). Treatment of animals suffering from primary indigestion in ruminants by conventional drugs is expensive whereas by use of herbal drugs, which are cheap, safe and without any side effect (Arora *et al.*, 1978; Nooruddin, 1983; Singh *et al.*, 1991, 1992), the problem can be solved. In this experiment an attempt was made to test the efficacy of some herbal drugs in ameliorating the problem of primary indigestion.

MATERIALS AND METHODS

Studies were conducted on lactating Murrah buffaloes (144) suffering from primary indigestion. The animals were selected randomly from the cases coming to the Veterinary Clinics of the University over a period of one year. Rumen liquor was collected using stomach tube and the pH SRL was measured. Blood samples were collected from the jugular vein of the animals. The case history, temperature, respiration and pulse rate were recorded.

RESULTS AND DISCUSSION

All the clinical cases, thus selected, had the history of dullness, depression, off-feed, not ruminating, suppressed milk production, hypo-galactia or agalactia. These cases were treated for 4-days and a few cases were kept in the indoor ward of the Veterinary Clinics for further observations.

On the basis of ruminal pH and clinical symptoms, the cases were categorized into four types of digestive disorders. These were five cases of bloat (pH ranging from 5.4 to 5.7), four cases of acidic indigestion (pH ranging from 5.8 to 6.99), 14 of impaction (pH ranging from 7.1 to 7.4), and 121 cases of alkaline indigestion (pH ranging from 7.5 to 9.3). The percent incidence of primary indigestion cases along with various treatments are shown in Table 1. The incidence of different kinds of digestive disorder appeared to be dependent upon the type of feed available during different months/seasons of the year coupled with direct or indirect effect of climate (Garg and Nangia, 1979; Singh *et al.*, 1989, 1990; 1996). Most of the cases of alkaline indigestion had a history of feeding on too much oat, sorghum and alphalpa fodder. While those of acidic indigestion had the history of excessive feeding of dry fodder and grains. Animals suffering from impaction had a history of having eating rotten and moulded wheat / paddy straw and sorghum stover, while cases having bloat had excessive feeding on green foddors like alphalpa, lucerne, mustard and sorghum.

All the cases had normal respiration and pulse rate as well as body temperature. However, respiration and pulse rate were slightly higher than normal in cases of tympanitis. All the cases were given 12 boluses of Pachoplus (2+2) daily for 3 days as an herbal ruminotonic or Ruchamax six of 15 g each (15 g + 15 g) daily for three days as an appetite stimulant / digestive tonic. A combination of Pachoplus and Ruchamax resulted in early recovery. Four cases (2.8%) having constipation were given magnesium sulphate and sodium chloride drench. Thirty-four cases (23.6%) with diarrhoea were given Diaroak as protective and adsorbent anti-diarrhoeal agent (@ 60 g daily, divided into 2 doses for 3 days). Surfactants like turpentine oil, formaldehyde and essential oil were used for immediate suppression of gases in cases of chronic bloat.

Payapro, an herbal drug, was prescribed to all the cases having suppressed milk production, hypo-galactia or agalactia due to indigestion or mastitis. The combination of *Leptadena reticulata*, *Nigella sativa*, *Foeniculum vulgare*, *Pueraria tuberosa* and *Asparagus racemosus* seem to be a potent combination of herbs, which provided stimulation for early restoration in cases of suppressed milk production. Janova capsules were prescribed (for 2 days in doses of 3 capsules per day) to 47 cases (32.6%) of anoestrus for inducing ovulatory oestrus.

Charmil, a multi-action skin gel, was applied to twenty-six cases (18%) suffering from cracked skin, eczema, ringworms, mange, dermatomycosis, cracked teats, foot lesions, skin eruptions and superficial injuries. These cases had problems mostly at the base of horns, and on the ears, brisket regions, hocks, grain, lateral chest and abdominal regions and the forehead.

The *Devdaru* and *Karanja* are known to possess milk irritant, antibacterial, antifungal and anti-parasitic properties. The present finding corroborate with the findings of other workers (Sinha *et al.*, 1982; Sangwan *et al.*, 1994).

Anthelmintics, mineral and vitamin supplements were prescribed to 57 cases (39.6%) having parasitic infestation and 135 cases (92.7%) having mineral and vitamin deficiencies. Ruminant

pH was adjusted to normal level by giving recommended doses of calcium carbonate buffer/ acids, alkalis and rumen inoculation was given to the buffaloes suffering from acidic indigestion, alkaline indigestion, impaction and bloat, respectively (Table) and thus normalizes the metabolic activities as well as production.

From the present study, it was inferred that these herbal preparations are very effective in curing more than 95% cases of primary indigestion and helpful in early restoration of milk production.

SUMMARY

Studies conducted on clinical cases of lactating buffaloes suffering from primary indigestion. On the basis of ruminal pH, these cases of indigestion were categorised into alkaline indigestion, impaction, acidic indigestion and bloat. The clinical efficacy of some herbal preparations were tested and found effective in curing digestive disorders and early restoration of normal milk production.

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Table 1. Herbal drugs and chemicals used for treatment of buffaloes suffering from various types of indigestion and other ailments

Name of the drug/chemical	Alkaline indigestion	Impaction	Acidic indigestion	Bloat	Total
Acid (for pH adjustment)	121	-	-	-	121
Alkalis (for pH adjustment)	-	-	04	05	9
Rumen liquor (for inoculation)	-	14	-	-	14
Pachoplus (Stomachic)	121	14	04	05	144
Payapro (Galactogogues)	80	06	-	-	86
Purgative	-	01	03	-	04
Diaroak (for checking diarrhoea)	24	-	-	10	34
Janova (for checking anoestrus condition)	28	19	-	-	47
Charmil (for skin infection)	18	08	-	-	26
Anthelmintics (for de-worming)	121	14	04	05	144
Vitamin and mineral supplements	121	14	04	05	144
Antibiotics (for control of mastitis)	15	03	-	-	18

REFERENCES

- Arora, S.P., S.S. Thakur, A.N. Tripathi and A. Chhabra (1978). Influence of Galog on digestibility and milk production of Karan Swiss cow. *Pashudhan*, **4** : 47-48.
- Garg, S.L. and O.P. Nangia (1979). Feeding behaviour in relation to circulating metabolites in buffaloes adapted to milk feeding. *Indian J. Anim. Sci.*, **49** : 607-610.
- Nooruddin, M. (1983). Clinical trial of Himalayan Batisa in loss of appetite of cattle. *Indian J. Anim. Sci.*, **8** : 69-70.
- Sangwan, A.K., N. Sangwan, S.S. Chaudhary and R.P. Gupta (1994). Clinical efficacy of a herbal gel and ointment against mange in rabbits. *Indian Vet. J.*, **71**: 925-929.
- Sinha, S.R.P., D.R. Deb and B.M. Sahai (1982). Effect of Charmil gel on cases of skin infections. *Indian J. Anim. Sci.*, **21** : 75-79.
- Singh, N., Ramesh Kumari and M.A. Akbar (1989). Biochemical and microbial changes in rumen of anorexic buffaloes. *J. Vet. Physiol Allied Sci.*, **8** : 36-44.
- Singh, N., Ramesh Kumari and M.A. Akbar (1990). Milk production as influenced by biogenic amines during different seasons in buffaloes. *Proceedings of the 2nd World Buffalo Congress* Vol. III. 281-284 p.
- Singh, N., Ramesh Kumari, R.S. Yadav, M.A. Akbar and B.P. Sengupta (1991). Effect of some commonly used galactagogues on milk production and biogenic amines in buffaloes. *Indian Vet. Med. J.*, **15** : 20-24.
- Singh, N., Ramesh Kumari and M.A. Akbar (1992). Effect of some commonly used stomachics on rumen volatile fatty acids, ruminal and circulatory biogenic amines, rumen microbes and milk production in buffaloes. *Indian Vet. Med. J.*, **16** : 189-193.
- Singh, N., M.A. Akbar, Ramesh Kumari and B.M. Khanna (1996). Effect of some treatment on ruminal environment and milk production in clinical cases of indigestion in buffaloes. *Indian Vet. Med. J.*, **120**: 115-118.

EFFECT OF DIFFERENT AMOUNTS OF TREATED SUGAR CANE TOPS SILAGE ON PERFORMANCE OF MILCH BUFFALOES

S. Noroozy and B. Alemzadeh

ABSTRACT

The present investigation was undertaken to study the effect of different amounts of treated sugar cane top silage on milk production of buffaloes in the southern part of Iran. Sixteen milch buffaloes in their third lactation (go days post partum) were used in a completely randomized design with four treatments and four replications. The treatments were different percentages of sugar cane top silage treated with 1 percent urea and 3 percent molasses (0, 33, 66 and 100 percent) replacing maize silage. The effect of treatments on feed consumption was not significant ($P>0.05$) and the average daily feed consumption was 13.00 kg. The results of milk yield (8.7 kg) and milk composition were similar to the control group. It is concluded that treated sugar cane top silage can replace up to 100% of maize silage in rations for milch buffaloes with no effect on intake, milk production and composition.

INTRODUCTION

The shortage of conventional feed resources is a major constraint for increased productivity of livestock and poultry in developing countries. Hence a search for unconventional feed has become necessary.

One such feed is sugar cane tops (SCT), a by-product obtained after the harvesting of the sugar cane plant. The tops are left on the ground in abundant quantities and the farmers use them directly for their animals without any processing.

In the southern part of Iran (Khuzestan Province) about 1.4 million tons of SCT are

obtained annually, and it is an important feed resource for ruminants. SCT is poor in protein (5.6%) and total digestible nutrients (46.80%). It is possible to increase the rumen fermentation of cane tops through judicious use of nitrogen - rich supplements, such treatment being an effective method for improvement of nutritive value in roughages (Deville and Cheong 1977).

Urea was first used as an ammonia source in the treatment of forage in 1970.

Using urea as a non - protein source supported a growth rate of 400 g/day in steers (Nassevan 1988). Naidoo and Halman (1983) reported that due to consumption of chapped SCT, there was no significant differences in milk production of Morisian cows. Ichikawa and Homma (1986) reported that buffaloes consume more SCT compared to dry roughages. Reddy and Prasad (1983) showed that SCT silage treated with molasses can be used in fattening lambs.

However in Khuzestan, there are about 120,000 river buffaloes that can utilize the cane tops. Ranjhan (1982) noted that buffaloes have the capacity to utilize sugar cane tops for production of milk. So the main objective of this study was to increase the nutritive value of SCT and determine the best amount of treated SCT silage in feeding of native dairy buffalo.

MATERIALS AND METHODS

Sugar cane tops were collected from the field and transferred to the research station. A chopper was used to cut the tops into 6 cm pieces. Urea - molasses liquid supplement (fertilizer grade

urea 1% and molasses 3%) was sprayed over each 15 cm thick layer of SCT. After treating all the tops were put in a mud - plastered trench silo for 45 days.

Milch buffaloes (16) in their third lactation (go days post partum) were divided into four groups of four animals each according to a completely randomized design, and fed different amounts of SCT, 0, 33, 66 and 100% substituted for maize silage. The animals were kept in individual stalls and the experimental diets were randomly assigned to them.

The total digestible nutrient (TDN) of the tops before and after treatment was determined in a separate experiment by Alamzadeh and Noroozy (1999).

Different traits such as daily milk production, dry matter intake and chemical composition of milk were determined during the experiment, and the data were analysed statistically (Steel and Torrie 1980).

RESULTS AND DISSCUSION

The chemical composition of the diet ingredients is shown in Table 1. Treating SCT with urea and molasses increased the crude protein from 1.25 to 6.75%, but there were no significant differences in TDN.

Table 1. Ingredients and chemical composition of the diet (percent)

Ingredients	DM	CP	TDN	Ca	P
Sngar cane tops before treating	30	1.25	46.80	0.62	0.07
Sugar cane tops after treating	28.5	6.75	48	0.64	0.08
Concentrate	97	17.09	76.5	0.15	0.71
Maize silage	35	6.5	70	0.80	0.09

The effect of different treatments on feed consumption were not significant ($P>0.05$). Singh and Solomon (1995) reported that the ensilaging of SCT at the time of harvesting and the addition of

molasses make the tops palatable for the animals. The average feed consumption was 13 kg per day. The nutrient requirements in all the groups were met by feeding the silage with concentrate mixture.

Table 2. Effect of substitution of treated SCT silage with maize silage on daily feed consumption, milk production and milk composition.

Treatment	Feed consumption (kg)	Daily Milk production (kg)	Total solid	Fat of milk %
0	13.50 ^a	8.91 ^a	17.04 ^a	7.09 ^a
33	13.00 ^a	8.99 ^a	17.00 ^a	6.97 ^a
66	12.50 ^a	8.51 ^a	17.00 ^a	7.48 ^a
100	13.00 ^a	8.41 ^a	17.06 ^a	7.17 ^a
SEM	0.68n.s	0.77n.s	0.40n.s	0.38n.s

There were no differences in the milk yield of all the groups after 150 days feeding ; the average milk production was 8.7 ± 0.77 kg.

The composition of milk also was similar in all the groups, and the average milk fat and dry matter

were 7.17 ± 0.88 and 17.02 ± 0.40 percent, respectively .

It is concluded that the treated SCT silage can be totally substituted for maize silage in the feeding of milch buffalos.

REFERENCES

- Alemzadeh, B. and S. Noroozy (1996). Nutritive value and digestibility of feedstuffs in Khuzestan Province of Iran. Agricultural and Natural resources Research Center of Khuzestan, Ahwaz, Iran.
- Deville, J. and y. Cheong (1977). Chemical quality of sugar cane tops. Silage made with and without molasses, urea and ammonia. International Society of Sugarcane Technology.
- Ichikawa, T. and H. Hommaa (1986). Comparative studies of feeding buffalo and cattle. *Japanese Journal of Tropical Agriculture*, **30** (4) : 214 - 256.
- Naidoo, G. and B. Hulman (1983). Effect of different levels of molasses on milk fat and milk in dairy cows. *Tropical Veterinary Journal*, **1**(1) : 76-78.
- Nassevan, M. R. (1988) Sugarcane tops as animal feed . *Sugarcane as Feed Book*, No. **72**: FAO.106-121.
- Ranjhan, S K. (1982) *Animal nutrition in tropics*. Vikas Publications, New Delhi – India.
- Reddy, R.R. and D.A. Prasad (1983). Performance, nutrient utilization and nitrogen balance of growing and finishing lambs fed complete ensiled diets. *Indian Journal of Animal Science*, **53**(4) : 287-392 .
- Singh, G.B. and S. Solomon (1995). *Sugarcane Agro - Industrial Alternatives*. Oxford Publications. New Delhi : 213-218.

DIAGNOSIS OF PREPATENT *FASCIOLA GIGANTICA* INFECTION IN AN EXPERIMENTALLY INFECTED BUFFALO CALF BY IMMUNOBLOTTING: AN APPROACH

S. Pal and C.K. Dasgupta

ABSTRACT

Immunoblotting was performed for early detection of *F. gigantica* infection in an experimentally infected buffalo calf using excretory – secretory (E-S) antigen. The disease was diagnosed from 6th day post-infection. A total of five immunoreactive bands were noticed with MW 97, 75, 69, 59 and 44 kDa among which 59 kDa was very thick, 69 and 44 kDa were sharp and 97 and 75 kDa were faint.

INTRODUCTION

Fasciolosis caused by *F. gigantica* is a serious economic disease of animals in countries with tropical climates. It is a major constraint for livestock industries due to high mortality and morbidity (Sharma *et al.*, 1989), decrease in weight gain (Chick *et al.*, 1980), fertility, milk yield and wool production and liver condemnation (Swarup *et al.*, 1987). The economic importance of *F. gigantica* to the livestock industries has stimulated research on many aspects of this parasite (Sanchez-Andrade, 1994). Prevalence of *F. gigantica* infection in some ruminants range up to 80-100 % in many countries like West Africa (Schillhorn Van Veen, 1980), India (Sharma *et al.*, 1989) and Pakistan (Kendall, 1954) etc. Among the different definitive hosts, the buffalo is the most susceptible. Although coprological examination for detecting eggs of the parasites is the most reliable diagnostic method, this technique is useful only about three months post-infection

(Soulsby, 1982). Pathology and disease usually occur as early as two weeks after the onset of infection. Therefore, this study was planned for early detection of *F. gigantica* in buffalo.

MATERIALS AND METHODS

Experimental infection and blood collection:

One parasite free male buffalo calf of about three months age was used for this study. It was maintained fully under stall feeding system. Animal was infected with 800 encysted metacercariae. Serum was collected at three days intervals and was kept at -20 C till further use.

Preparation antigen:

The adult *F. gigantica* flukes were collected from the buffalo slaughterhouse at Tangra, Kolkata. The flukes were washed in normal saline solution initially and then 3-4 times with the chilled 0.15 M phosphate buffered saline (PBS) solution (pH 7.4). Finally, a few flukes were left in PBS solution at rate of 25 flukes/ 10 ml solution in incubator at 37 C for 3 hour to get E-S antigen. Afterward, the solution was centrifuged at 12,000 r.p.m. at 4 C for 40 minutes and the supernatant was collected. The protein concentration of this E-S antigen was determined as per the standard method of Lowry *et al.* (1951) and was stored at -20 C for further use.

Immunoblotting:

Immunoblotting was carried out as per the method of Mousa (2001) with little modification. After conducting SDS-PAGE of E-S antigen of *F. gigantica*, different polypeptides were transferred on the nitrocellulose paper (NCP) using transblot apparatus. The NCP was then cut according to each lane after washing with PBS/Tween-20 (0.05%). Thereafter, all strips were immersed in blocking solution containing 3% bovine serum albumin (BSA) in PBS/T and incubated at 37 °C for 2 h. The strips were then washed four times of 5 minutes each with washing solution. Then the strips were immersed in serum samples collected from the experimentally infected calf on days 0, 3, 6, 9 and 12 diluted at 1:50 in PBS/T with BSA (3%) and incubated for 2 h. at 37 °C. The strips were given four washings and again incubated for 1 hr. at 37 °C with anti-species HRPO conjugate at a 1: 1000 dilution in PBS/T. Finally, all strips were washed as before and then immersed in substrate solution till the bands appeared. Immediately thereafter, the strips were immersed in distilled water to avoid excessive background color and dried using filter paper.

RESULTS AND DISCUSSION

The infected calf was shedding the eggs of *F. gigantica* by 14 weeks after infection in its faeces. At the end of the experiment the calf was sacrificed to see the number of flukes and the pathological condition and 107 adult *F. gigantica* flukes were recovered from the gall bladder and bile ducts.

Immunoblotting revealed that serum samples of days 6, 9 and 12 showed immunoreactivity with 97, 75, 69, 59 and 44 kDa MW polypeptides (Figure 1). Among these five immunoreactive bands, the band at 59 kDa MW peptides was thickest whereas the 69 and 44 kDa MW bands were very sharp and the bands of 97 and 75 kDa MW were faint. Sera of days 0 and 3 did not show any reaction.

This findings were similar to those of Guobadia and Fagbemi (1995), who detected four

polypeptides in the range of 43-75 kDa MW with *F. gigantica* infected sheep sera a early as 2 weeks after infection by immunoblot and more polypeptides as the infection progressed. Immunoblotting is held to be the most sensitive serodiagnostic test in detecting antibodies at early stages of infection. The most striking finding in the present research study was the detection of *F. gigantica* antibodies in the experimentally infected calf serum from the 6th day onward. Still, further confirmation may be needed by performing the test in a larger number experimental animals and or by using *F. gigantica* specific polypeptide for applying the test under field conditions as the sharing of antigens with other helminthes is well established.

REFERENCES

- Chick, B.F., O.R. Coverdale and A.R. Jackson (1980). Production effect of liver Fluke (*F. hepatica*) infection in beef cattle. *Australian Vet. J.*, **56**(12): 588-592.
- Goubadia, E.E. and B.O. Fagbemi (1995). Time course analysis of antibody response by EITB and ELISA before after chemotherapy in sheep infected with *Fasciola gigantica*. *Vet. Parasitol.*, **58**: 247-253.
- Kendall, S.B. (1954). Fascioliasis in Pakistan. *Annals of Trop. Med. And Parasitol*, **48**: 307-313.
- Mousa, W.M. (2001). Evaluation of cercarial antigen for the serodiagnosis of fasciolosis in experimentally infected sheep. *Vet. Parasitol.*, **97**: 47-54.
- Sanchez-Andrade, R., A. Paz-Silva , J. Suarez, R. Panadero , P. Diez-Banos and P. Morrondo (2000). Use of a sandwich-enzyme-linked immunosorbent assay (SEA) for the diagnosis of natural *Fasciola hepatica* infection in cattle from Galicia (NW Spain). *Vet. Parasitol.*, **93**: 39-46.
- Schillhorn van Veen, T.W. (1980). Fascioliasis (*Fasciola gigantica*) in West Africa: a review. *Veterinary Bulletin*, **50**: 529-533.

Sharma, R.L., D.N. Dhar and O.K. Raina (1989). Studies on the prevalence and laboratory transmission of fascioliasis in animals in the Kashmir valley. *British Vet. J.*, **145**: 57-61.

Soulsby, E.J.L. (1982). *Helminths, Arthropods and Protozoa of Domesticated Animals*, ELBS, Bailliere Tindall, London.

Swarup, D., S.P. Pachauri, B. Sharma and S.K. Bandhopadhyay (1987). Serodiagnosis of *Fasciola gigantica* in buffaloes. *Vet. Parasitol.*, **24**: 67-74.

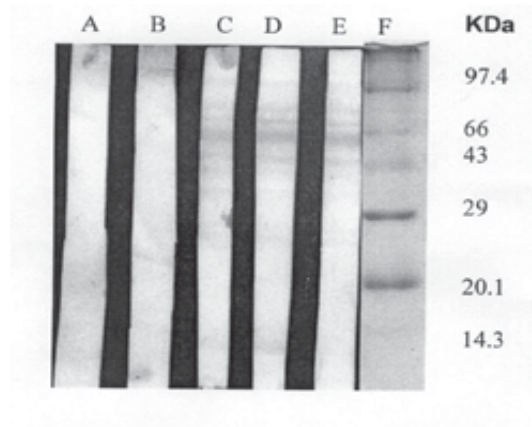


Figure 1. Immunoblotting of ES antigen of *F. gigantica* with the serum of experimentally infected buffalo calf on day 0 (A), 3(B), 6(C), 9(D) and 12 (E).

RESEARCH ABSTRACTS

ANATOMY

Laila, R. Hassan. *Animal Production Research Institute, Dokki, Cairo, Egypt. Characteristics of cellular junctions in mammary alveoli in Egyptian buffaloes. Bubalus bubalis* (2005). 3:57-65.

This experimentation was carried out on five Egyptian buffaloes, to study the changes in the alveolar mammary cells junctions throughout the lactation season. The work was executed to study the relation between the changes in the cellular junctions and milk major cations (Ca^{++} , Na^{+} & K^{+}) throughout the lactational season. Biopsies of mammary parenchyma were taken at two stages, at early lactation and near to the end of lactation (early involution). At early stage of lactation the tight junction was 19.78 0.99 nm in width and 174.16 22.36 nm in length. At the involution stage the junctions were, in general, abolished and substituted by wide intercellular spaces (1349.12 51.31 nm), the number of ridges along 5 micron of junction at the early stage of lactation was 6.15 0.11. The gap between external and internal nuclear membranes was 36.39 1.75 nm in fully lactating cells and 127.27 6.27 nm in involuting cells. The concentrations of Ca^{++} were 12.86 0.60 and 11.12 0.57 mg/dl in blood plasma and 135.87 3.50 and 121.56 4.01 mg/dl in milk at lactation and involution stages, respectively. The Na^{+} concentration in milk was increased significantly with advancement of lactation (89.11 3.91 and 120.76 5.18 mg/dl.), while the concentration in blood plasma was constant (448.08 23.81 and 449.18 22.15 mg/dl) at early lactation and involution stages, respectively. The K^{+} concentration increased with advancement of lactation; by 20% in blood plasma and 10% in milk (32.93 2.01 and 39.77 2.81 mg/dl Plasma and 148.00 4.89 and 163.17 16.38 mg/dl Milk, at early and late stages, respectively).

BREEDING AND GENETICS

Avinash Premraj, E. Sreekumar, Binita Nautiyal and T.J. Rasool. *Animal Biotechnology Laboratory, Rajiv Gandhi Center for Biotechnology (RGCB), Jagathy, Thycad PO, Trivandrum 695 014, Kerala, India. Molecular characterization and prokaryotic expression of buffalo (Bubalus bubalis) Interleukin-6. Molecular Immunology* (2006). 43 (3) : 202-209.

The study describes the characterization of Interleukin-6 cDNA and essential promoter sequences of the Indian Water Buffalo (*Bubalus bubalis*) and expression of the recombinant IL-6 in *Escherichia coli*. Buffalo IL-6 shows very high nucleotide level identity of the cDNA (98.7%) and promoter (98%) sequences with the corresponding cattle sequences. All the major regulatory elements of IL-6 promoter like AP-1, Multiple Response Element, NF-IL6, ETS binding domain and NF- κ B binding sites show absolute conservation. Basal level IL-6 mRNA is detected in organs like liver, lung and spleen. Concanavalin A stimulated splenocytes produced maximum IL-6 mRNA at 8 h poststimulation. Recombinant IL-6 production in JM109 (DE3) and BL21 (DE3) pLysS bacterial system is substantially enhanced supplementation of rare codon tRNAs through co-transformation with a second plasmid. BL21 (DE3) pLysS strain is a more efficient producer of the IL-6 as it expressed two-fold more protein than by JM109 (DE3) cells. The study shows high-level conservation of IL-6 regulatory and coding sequences between cattle and buffalo, and indicates the use of a common reagent for studying the effects of this cytokine in these species.

Perucatti, A., S. Floriot, G.P. di Meo, D. Soglia, R. Rullo, S. Maione, D. Incarnato, A. Eggen, P. Sacchi, R. Rasero and L. Iannuzzi. *National Research Council (CNR), ISPAAM, Laboratory of Animal Cytogenetics and Gene Mapping, Via Argine 1085, IT-80147 Naples, Italy.* **Comparative FISH mapping of mucin 1, transmembrane (MUC1) among cattle, river buffalo, sheep and goat chromosome : comparison between bovine chromosome 3 and human chromosome 1.** *Cytogenic and Genome Research* (2006). **112** (1/2) : 103-105.

Four bovine BAC clones (0494F01, 0069D07, 0060B06, and 0306A12) containing MUC1, as confirmed by mapping MUC1 on a RH3000 radiation hybrid panel, were hybridised on R-banded chromosomes of cattle (BTA), river buffalo (BBU), sheep (OAR) and goat (CHI). MUC1 was FISH-mapped on BTA3q13, BBU6q13, OAR1p13 and CHI3q13 and both chromosomes and chromosome bands were homoeologous confirming the high degree of chromosome homoeologies among bovids and adding more information on the pericentromeric regions of these species' chromosomes. Indeed, MUC1 was more precisely assigned to BTA3 and assigned for the first time to BBU6, OAR1p and CHI3. Moreover, detailed and improved cytogenetic maps of BTA3, CHI3, OAR1p and BBU6 are shown and compared with HSA1.

FEEDING AND NUTRITION

Hayashi, Y., K.L. Maharjan and H. Kumagai. *Graduate School for International Development and Cooperation, Hiroshima University, Higashi-Hiroshima 739-8529, Japan.* **Feeding traits, nutritional status and milk production of dairy cattle and buffalo in small-scale farms in Terai, Nepal.** *Asian-Australasian Journal of Animal Sciences* (2006). **19** (2) : 189-197.

Twenty small-scale farms of two villages (A and B) were surveyed to identify the feeding traits, milk productivity and nutritional status of lactating cattle and buffalo in Terai, Nepal. Constituents and dry matter (DM) of feed supplied, body condition score (BCS), heart girth (HG), bodyweight (BW), milk yield (MY) and plasma metabolites were obtained in the pasture-sufficient, pasture-decreasing and fodder-shortage periods. Milk yield of 305-day lactation was estimated by the daily MY. The supplies of rice straw and native grass were lower and higher in the pasture-sufficient period than in the other periods, respectively (5.5 kg/day vs. 9.8 kg/day and 3.2 kg/day vs. 0.4 kg/day, respectively, $p < 0.01$). The roughage-supplement rates of the animals were higher in village A than in village B (5.0 vs. 2.2 in cattle and 9.3 vs. 1.8 in buffalo, $p < 0.01$). The variance of feed constituents among the periods and between the villages induced different supplies of CP, NDF and TDN. The concentrations of CP and TDN in the cattle feed were higher in the pasture-sufficient period than in the other periods (9.1% vs. 7.3% and 57.4% vs. 51.0%, respectively, $p < 0.01$). The supplies of CP for cattle and buffalo, and of TDN for buffalo were lower in village A than in village B (7.5% vs. 8.7% and 6.6% vs. 9.1% [$p < 0.01$], and 53.1% vs. 56.2% [$p < 0.05$], respectively). The BCS, HG and BW of the animals were lower in village A than in village B (2.51 vs. 2.86, 156 cm vs. 170 cm and 300 kg vs. 318 kg, respectively in cattle, 2.83 vs. 4.00, 186 cm vs. 216 cm and 429 kg vs. 531 kg, respectively in buffalo, $p < 0.01$). The cattle yielded more milk in the pasture-sufficient period than in the other periods (7.9 liters/day vs. 6.6 liters/day, $p < 0.01$).

The 305-day MY of cattle that calved in the fodder-shortage period was lower than that of cattle that calved in the other periods (1,900 liters vs. 2,251 liters, $p < 0.01$). The MYs of cattle and buffalo were lower in village A than in village B (6.2 liters/day vs. 8.1 liters/day and 3.7 liters/day vs. 7.7 liters/day, respectively, $p < 0.01$). The 305-day MY of cattle was lower in village A than in village B (1,935 liters vs. 2,409 liters, $p < 0.01$). The concentrations of plasma albumin and urea nitrogen in cattle were lower in village A than in village B (3.2 g/dl vs. 3.4 g/dl [$p < 0.01$] and 7.4 mg/dl vs. 10.2 mg/dl [$p < 0.05$], respectively). The different supplies of CP, NDF and TDN among the periods and between the villages might have affected MY and nutritional status in cattle and buffalo. It was likely that the lower supplies of CP and TDN for cattle that calved in the fodder-shortage period and in village A lowered the 305-day MY of cattle.

Panda, N., H. Kaur and T. K. Mohanty, *Division of Dairy Cattle Nutrition, National Dairy Research Institute, Karnal - 132 001, India. Reproductive performance of dairy buffaloes supplemented with varying levels of vitamin E. Asian-Australasian Journal of Animal Sciences* (2006). **19** (1) : 19-25.

The effect of vitamin E supplementation on plasma alpha -tocopherol level, total antioxidant level and reproductive performance in Murrah buffaloes was studied during periparturient period. Twenty-four advance pregnant buffaloes were randomly divided into four equal groups as T1, T2, T3 and T4 and were supplemented with 0, 1,000, 1,500 and 2,000 IU of alpha -tocopheryl acetate (Merck) from 60 days prepartum to 30 days postpartum and 0, 500, 750 and 1,000 IU from 30 to 60 days postpartum, respectively. Blood samples were collected at -60, -45, -30, -15, -7, 0, 7, 15, 30 and 60 days of parturition and were analyzed for plasma alpha -tocopherol and total antioxidant activity (TAA). The intake of DM, CP and TDN did not vary among different groups. Plasma

alpha -tocopherol and TAA around parturition (-7 to 15 day) in T3 and T4 were significantly higher than the control group. There was 17% reduction in retention of fetal membranes (RFM) and metritis in T4 than control. The post partum estrus interval averaged 58.00, 55.33, 51.83 and 43.00 days in T1, T2, T3 and T4 respectively. There was significant reduction in days open in both T3 and T4 in comparison to T1 group (127,130 Vs. 146). All the vitamin E supplemented groups showed reduction in days open than their previous lactation performance. Supplementation of vitamin E at 1,500 IU d-1 from 60 day prepartum to 30 day postpartum to buffaloes exhibited beneficial effect on plasma alpha -tocopherol level and TAA around parturition and continuation of its supplementation at 1,000 IU d-1 from 30 to 60 days of lactation improved postpartum reproductive performance of buffaloes.

Sarwar, M., Mahr-un-Nisa, M.A. Khan and M. Mushtaque. *Institute of Animal Nutrition and Feed Technology, University of Agriculture, Faisalabad, Pakistan. Chemical composition, herbage yield and nutritive value of Panicum antidotale and Pennisetum orientale for Nili buffaloes at different clipping interval. Asian-Australasian Journal of Animal Sciences*, (2006). **19** (2) : 176-180.

This study was carried out to establish clipping interval of Pennisetum orientale (PO) and Panicum antidotale (PA) to get maximum biomass production with optimal nutritional value for Nili buffaloes. Two clipping intervals i.e. CI1, and CI2 (clipped after every one and two months, respectively) were studied for both grasses. The data on various parameters were compared with PO and PA each clipped at 4 months of age (control). Leaf to stem ratio in both PO and PA declined with increasing clipping interval. Concentration of dry matter (DM) and organic matter (OM) increased ($p < 0.05$) whereas crude protein contents decreased with increasing clipping interval in both grasses. Crude protein and dry herbage yields in PO and PA increased ($p < 0.05$) with increasing clipping interval. The DM and neutral detergent fiber (NDF) digestibilities of PO

and PA in ruminally cannulated buffalo bulls decreased ($p < 0.05$) due to more lignification with increasing clipping interval. Ruminal extent of digestion, rate of disappearance of DM and neutral detergent fiber of PO and PA decreased in buffaloes while ruminal lag time of these nutrients increased significantly ($p < 0.05$) with increasing clipping interval. The results from the study imply that two month clipping interval for both PO and PA grasses favored higher biomass with greater nutritional value for Nili buffaloes and sustained grass vigor.

Kang, R.S., A.S. Nanda and P.S. Brar. *Punjab Agricultural University, Ludhiana, Punjab 141 004, India. Effect of urea molasses multinutrient blocks (UMMB) supplementary feeding on therapeutic efficacy of hormonal treatment in anoestrus buffaloes. Indian Journal of Animal Sciences* (2005). **75** (11) : 1261-1265.

The present work was undertaken to study the reproductive performance of anoestrus buffaloes following urea molasses multinutrient block (UMMB) supplementary feeding and, the effect of UMMB pre-supplementation on therapeutic efficacy of hormonal treatment. Anoestrus buffaloes (30) were supplemented with UMMB for 30 days and 10 anoestrus buffaloes were kept as unsupplemented control. During experimental period of UMMB supplementation 40% buffaloes (12/30) exhibited behavioural oestrus compared to 10% (1/10) in control. On day 31, ten supplemented and 9 unsupplemented buffaloes which were still anoestrus were treated with 3 intramuscular injections of 750 mg hydroxyprogesterone at 72 hr interval followed by 750 IU PMSG intramuscularly on the last day of progesterone treatment. Progesterone-PMSG treatment induced oestrus between 72-96 hr in 80% of the UMMB supplemented buffaloes compared to 67% in unsupplemented control. The temporary decline in milk yield following the progesterone-PMSG treatment occurred in all buffaloes that experienced oestrus but it was lower (18%) in UMMB supplemented buffaloes than that in unsupplemented (40%) control. Overall pregnancy rate in buffaloes induced to oestrus with UMMB

supplementation were 88%. However, none of the buffaloes induced to oestrus with PMSG conceived on induced oestrus but they exhibited regular ovarian cyclicity thereafter, and conceived on successive second or third oestrus. The overall conception rate was 87% with 2.4 services/conception in supplemented group (UMMB+PMSG) and 83% with 2.6 services/conception in unsupplemented (only PMSG) control. From the study it was concluded that a 30 day-UMMB supplementation induced oestrus in 40% summer anoestrus buffaloes and improved the oestrus response of buffaloes to progesterone-PMSG treatment in inducing oestrus and reduced the milk losses, which occurred as sequel to hormonal treatment by improving the nutritional status of buffaloes.

Thomas, C. S., J. Nordstrom, K. Svennersten-Sjaunja and H. Wiktorsson. *Department of Animal Nutrition and Management, Swedish University of Agricultural Sciences, Kungsängen's Research Centre, SE-753 23 Uppsala, Sweden. Maintenance and milking behaviours of Murrah buffaloes during two feeding regimes. Applied Animal Behaviour Science* (2005). **91** (3/4) : 261-276.

Diurnal maintenance behaviour and behaviour during milking in a mechanised system with two feeding regimes were studied in 14 Murrah buffaloes managed in a highly mechanised system. Normal fixed rations of roughage and concentrates and established milking routines (T-I) were compared to a regime with increased access to roughage and 50% reduction in in-parlour feeding (IPF) of concentrate (T-II). Reduced concentrate was compensated in the out of parlour feeding system (AFS). Buffaloes spent 23, 39, and 33% of their time eating, resting, and standing, respectively. This is comparable to what has been observed in cattle under similar management systems. Significant diurnal differences were observed in all behaviours except walking. Buffaloes ruminated significantly longer at night when standing in T-I while in T-II,

they ruminated significantly longer when lying at night ($P<0.05$). Total sleeping behaviour was significantly longer in T-II than T-I ($P<0.05$). This could indicate that the animals were more satisfied and restful as a consequence of extended access to roughage. Milk let down and time to 500 g of milk was significantly earlier in T-I than in T-II ($P<0.05$). Average daily milk yield tended to be lower in T-II than T-I ($P<0.10$). Disturbances due to the changed IPF routines were reflected in a significantly higher oral behaviour in the parlour ($P<0.05$). In conclusion, buffaloes are sensitive to the slightest change in milking routines, which is reflected in milk flow and the milk yield.

Nand Kishore and S. Vidya. *CCS Haryana Agricultural University, Haryana 125 004, India. Effect of feeding reconstituted and urea treated bajra grain (*Pennisetum typhoideum*) on the growth and performance of buffalo calves. Indian Journal of Animal Sciences (2005). 75 (12) : 1408-1412.*

Growing buffalo calves ($n=20$) were divided into 4 groups and fed concentrate mixture consisting of barley, groundnut cake and rice polish (T1), barley was replaced with raw bajra grain (T2), barley was replaced with reconstituted bajra grain (T3) and 40% of the concentrate mixture was replaced with 4% urea treated bajra grain (T4). All the concentrates were isonitrogenous. Wheat straw was fed ad libitum as a basal diet. The average daily DM intake due to treatments was statistically similar. The digestibility coefficients of OM, CP, CF and NFE were significantly ($P<0.01$) lower in T2 than in T1, T3 and T4. The 4 respective diets contained 8.10, 7.22, 8.06 and 8.60% DCP and 63.33, 57.18, 62.91 and 64.69% TDN, which were lower ($P<0.01$) in T2 than in the other treatments. The nitrogen balance was statistically similar in all the treatments. The average daily weight gain (g) was highest in T4 (529.51) followed by T3 (514.75), T1, (508.20) and was lowest in T2 (442.62). However,

the differences were nonsignificant. Average body weight gain/100 kg body weight was significantly ($P<0.01$) lower in T2 than in T1, T3 and T4. DM consumed per kg gain was 9.40 kg in T2 which was higher ($P<0.05$) than 8.35 kg in T1, 8.29 kg in T3 and 7.93 kg in T4. Cost/kg liveweight gain including the cost of bajra grain processing was Rs 23.51, 25.80, 22.38 and 22.21 in treatments T1, T2, T3 and T4, respectively.

Rani, N., M. Wadhwa, S. Kaushal and M. P. S. Bakshi. *Department of Animal Nutrition, Punjab Agricultural University, Ludhiana - 141 004, India. Herbal feed additives and growth of buffalo calves. Animal Nutrition and Feed Technology (2006). 6(1) : 147-151.*

This study was undertaken to determine the effect of two herbal feed additives, individually or in combination, on the nutrient utilization and growth of buffalo calves. Twenty male buffalo calves, divided into 4 groups, were offered a conventional control diet or control diet supplemented with either *Eclipta alba* (bhringraj), *Kutki picorrhiza* (kutki) or combination of *E. alba* and *K. picorrhiza* in 1:1 ratio at 0.4% of the DM intake. The supplementation of herbal feed additives was withdrawn completely, 30 day after the start of the 77 day growth trial. Simultaneously, rumen studies were also conducted on 6 rumen fistulated male buffalo calves to assess the effect of herbal feed additives on biochemical changes in the rumen. The data revealed that the daily DM intake, digestibility of nutrients and N retention, various rumen metabolites and liveweight gain were comparable among the groups. It was concluded that kutki and bhringraj, alone or in combination, when supplemented at 0.4% of diet for 30 day, did not have any persistent beneficial effects on the performance of buffalo calves till 77 day post-exposure.

HEALTH AND DISEASES

Mukherjee, F. *National Dairy Development Board, Anand 388 001, Gujarat, India.*
Comparison of semen characteristics of non-reactors and tuberculin and Johnin reactor buffaloes from a semen station.
Buffalo Journal (2005). **1** : 39-51.

The ejaculate volume, mass activity, sperm concentration, post thaw motility, live sperm percentage were reduced in tuberculin and Johnin reactor Murrah and Surti buffaloes as compared to non reactors. Surti reactors had reduced ejaculate volume, mass activity, initial motility and post thaw motility percentages and increased percentage of abnormal sperms compared to controls. A dip in value below the cut-off level (Least value) for all seven semen characteristics based on a three-point judgment criteria ranked the post thaw motility percentage to be the most affected characteristic among Murrah reactors. Mass activity, ejaculate volume, sperm concentration were ranked second to fourth most affected characteristic, respectively among Murrah reactors. For Surti bulls, mass activity was ranked first; post thaw motility and abnormal sperm percentage second, ejaculate volume fourth. The rank analysis also revealed that a Johnin reactor, two tuberculin reactors and two double reactors were most affected among Murrah bulls. One Johnin reactor whose 4 out of 7 semen characteristics were inferior to non-reactors was most affected among Surti bulls. However, the means of all 7 semen characteristics of reactors did not differ significantly ($P>0.05$) from the non-reactors in Murrah as well as Surti bulls.

Molina, E.C., E.O. Sinolinding and A. Peralta.
School of Tropical Veterinary and Animal Sciences, James Cook University, Townsville, Queensland 4811, Australia.
Clinicopathological indications of resilience of swamp buffaloes to infection with *Fasciola gigantica*.
Tropical Animal Health and Production (2005). **37** (6) : 451-455.

The clinicopathological responses of swamp buffaloes naturally infected with *F. gigantica* were evaluated to determine whether these parameters would indicate resilience to infection with the parasite. Blood samples were collected from 175 buffaloes slaughtered in an abattoir in Davao, Southern Mindanao, Philippines [date not given]. Erythrocyte count, haemoglobin and haematocrit values, gross liver damage and the number of liver flukes were assessed. It was shown that natural infection with *F. gigantica* did not adversely affect the haematological values of the buffaloes. Erythrocyte count was higher in infected buffaloes, while there were no significant differences in the haemoglobin and haematocrit values between infected and healthy buffaloes. Erythrocyte count and haematocrit values were significantly higher in animals with a high fluke burden (>70) compared to those with no flukes and those with a medium fluke burden (21-70 flukes). No differences in haemoglobin were observed between animals with low, medium, high or no fluke burdens. Erythrocyte count was higher in buffaloes with moderate and severe liver damage than in those with no or with slight liver damage. Animals with moderate liver damage had significantly higher haemoglobin values compared to those with slight liver damage. These results show that buffaloes are not severely affected by natural infection with *F. gigantica*, indicating that these animals are resilient to infection with the parasite.

Naresh, R., D. Swarup, M.C. Sharma and R. Ranjan, *Division of Medicine, Indian Veterinary Research Institute, Izatnagar - 243 122, Uttar Pradesh, India.*
Clinical management of sarcoptic mange in Indian buffalo calves with a botanical ointment.
Veterinary Record (2005). **156** (21) : 684-685.

Nine Murrah breed buffalo calves less than one year of age, 7 females and 2 males, showed non-pruritic clinical mange infestation. Seven exhibited severe skin lesions all over the body; the skin had thickened and large, dry, exudative crusts, and haemorrhagic and non-haemorrhagic fissures on the upper neck were present. Severe dermatitis and

alopecia were observed on the skin of the face, upper eyelids, poll and ear. Acute dermatitis was observed on the lower neck, hind and forelegs and the thoracic, abdominal, inguinal and peri-inguinal regions, with red discoloration. The other 2 calves had painful lesions in the pastern area and interdigital space. Lesions were common on the upper part of the neck in all the animals. The affected areas were shaved and treated with a botanical ointment, applied twice daily at 09.00 and 16.00 h for 7-15 days until the disappearance of clinical signs. The ointment contained *Allium cepa*, *Citrus medica*, *Curcuma longa*, *Camphora officinarum* (*Cinnamomum camphora*), *Allium sativum*, *Derris indica* (*Pongamia pinnata*) and *Sesamum indicum* oil. The efficacy of the treatment was assessed based on healing of the skin lesions and the absence of mites (*Sarcoptes scabiei* var. *bovis*) on the skin. All 9 calves were free of clinical signs by day 15. The skin scrapings from all the animals were negative for mites on days 7, 15 and 30. Skin lesions were still present on 7 calves on day 7; the lesions on the upper part of the neck healed totally by day 15. Dermatitis on the skin of the face, upper eyelids, poll and ear disappeared, and there was fresh hair growth. The lesions on lower parts of the body showed complete recovery by day 15. The lesions of the pastern area and interdigital space of the forelimbs of 2 of the calves disappeared totally by day 15. The animals remained free from skin lesions and mites up to day 30. Their recovery period ranged from 7 to 15 days, average of 12-33 days.

Diptee, M. D., A. A. Adesiyun, Z. Asgarali, M. Campbell and R. Adone. *Faculty of Medical Sciences, School of Veterinary Medicine, University of the West Indies, Champs Fleurs, Trinidad and Tobago.* **Serologic responses, biosafety and clearance of four dosages of Brucella strain RB51 in 6-10 months old water buffalo (*Bubalus bubulis*).** *Veterinary Immunology and Immunopathology* (2006). **109** : 43-55.

Thirty water buffalo were obtained from a brucellosis-free farm in order to evaluate antibody responses, bacterial clearance and safety to *Brucella abortus* strain RB51 vaccine in a dose response study. The animals were randomly divided into five treatment groups. Groups I-V received the recommended dose of RB51 vaccine (RD) once, RD twice 4 weeks apart, double RD once, double RD twice 4 weeks apart and saline once, respectively. Antibody responses to RB51 were monitored at 2, 4, 6, 8, 10, 12, 16, 18, 22, 24 and 27 post-initial-inoculation weeks (PIW). Clearance of RB51 from the prescapular lymph node was evaluated at 2, 4, 6, 12, 18 and 24 PIW for groups 1, III and V and at 6, 8, 10, 16, 22 and 27 PIW for groups II and IV. To evaluate shedding of the RB51 strain, nasal, conjunctival, vaginal or preputial swabs were taken from all experimental animals at 1, 2, 3, 4, 6, 8 and 12 PIW. Sera taken at all PIW were negative for field strain *B. abortus* by both the buffered plate agglutination test (BPAT) and competitive enzyme-linked immunosorbent assay (c-ELISA). Antibody responses to RB51 were demonstrated in all vaccinates but not in the controls, up to 12 PIW, by complement fixation test (CFT) and the dot-blot assay with an 83.7% agreement for both tests. Clearance of RB51 occurred between 6 and 12 PIW in group I but less than 2 weeks after booster vaccinations in groups II and IV and between 4 and 6 PIW in group III. RB51 was not recovered at any time from swabs obtained from either RB51-vaccinates or non-vaccinates. The results of this study indicate that serologic responses to RB51 vaccination can be monitored by both CFT and dot-blot assay in water buffalo. Our data also indicates that RB51 vaccination does not interfere with brucellosis sero-surveillance and is safe (no serological and bacteriological evidence of spread to non-vaccinates, no adverse clinical signs or detectable abnormalities on haematology and serum biochemistry) for use in water buffalo.

Satinderpal Singh, V.K. Gandotra, S.K. Sharma and A.K. Srivastava. *Punjab Agricultural University, Ludhiana, Punjab 141004, India. Comparative pharmacokinetics of cefotaxime in normal cyclic and endometritis affected buffaloes. Indian Journal of Animal Sciences (2005). 75 (12):1368-1371*

The pharmacokinetics and dosage regimen of cefotaxime were investigated in normal cyclic and endometritis affected buffaloes (6 each). Cefotaxime was administered at 10 mg/kg bw by intramuscular injection in all animals. In normal cyclic buffaloes, peak concentration of cefotaxime reached 8.16 plus or minus 0.04 micro g/ml at 15 minutes and the drug was detected up to 8 h. In buffaloes with endometritis, the plasma levels were significantly lower but the drug was detected up to 12 h. In normal cyclic buffaloes, the absorption half-life, elimination half-life, volume of distribution and mean residence time (MRT) values were 0.85 plus or minus 0.27 h, 187 plus or minus 0.08 h, 1.62 plus or minus 0.04 litres/kg and 2.83 plus or minus 0.12 h, respectively, while in buffaloes with endometritis, the corresponding values were 0.19 plus or minus 0.05 h, 5.12 plus or minus 0.78 h, 3.24 plus or minus 0.38 litre/kg and 7.49 plus or minus 1.10 h, respectively. Uterine concentration of cefotaxime was comparatively higher in buffaloes with endometritis than normal buffaloes. To maintain a minimum therapeutic concentration of 1 micro g/kg bw, the satisfactory dosage regimen of cefotaxime in buffaloes with endometritis is 12 mg/kg bw followed by 8.5 mg/kg bw at 8 h intervals.

MANAGEMENT AND PRODUCTION

Nayak, S.K., Sumit Arora, J.S. Sindhu and R.B Sangwan. *Dairy Chemistry Division, National Dairy Research Institute, Karnal - 132 001, Haryana, India. Effect of chemical phosphorylation on solubility of buffalo milk proteins. International Dairy Journal (2006). 16 (3) : 268-273.*

Buffalo milk proteins (casein, co-precipitate or whey protein concentrate) were phosphorylated with phosphorus oxychloride (POCl₃) at three different pH values (5.0, 7.0 and 9.0). The solubilities of phosphorylated milk proteins were examined over the pH range 3.0-9.0 in water and ionic (0.1 M NaCl or 10-70 mm Ca²⁺) systems. The solubilities of buffalo milk proteins decreased at pH 3.0, while there was an increase in the solubilities of casein and co-precipitate near their isoelectric points upon phosphorylation. Solubilities of these phosphorylated milk proteins were pH dependent in 0.1 M NaCl but there was a decrease in their solubilities with increase in calcium ion concentration. This alteration could be due to the shifting of isoionic points of phosphorylated buffalo milk proteins towards acidic pH.

Muthukumar, M., B.M. Naveena, A.R. Sen and Y. Babji. *National Research Centre on Meat, CRIDA Campus, Santoshnagar, Hyderabad, India. Assessment of quality attributes and shelf life of buffalo haleem under refrigerated storage (4 plus or minus 1 deg C). Buffalo Journal (2005). 1 : 1-8.*

A study was undertaken to assess the quality attributes and shelf life of buffalo haleem, a traditional meat product of Hyderabad, India. The quality parameters viz., pH, proximate composition, objective colour values, microbial profile and sensory attributes of fresh and refrigerator store (4 ± 1 C) haleem were analyzed. The product had higher initial pH (6.75) and aerobic plate counts (4.58 log cfu/g). The moisture, protein, fat, ash and carbohydrate content (%) of haleem was 71.74, 7.67, 7.88, 1.13 and 11.59, respectively. There was significant (P<0.05) change in pH, TBA number, instrumental colour values (lightness and redness), microbial profile (aerobic plate counts, Coliform and Staphylococcus) and sensory attributes after 10 days of storage period. The product was found to be physico-chemically, microbiologically and sensorily acceptable up to 10 days in aerobic package under refrigerated storage (4 ± 1 C).

Ismail, M.M. *Dairy Technology Department, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Giza, Egypt. Manufacture of Domiati cheese from reconstituted skim milk and different types of cream. Egyptian Journal of Dairy Science* (2005). **33** (2) : 247-259.

Domiati cheese was made from mixed buffalo and cow milks (5% fat) as the control and reconstituted skim milk (RSM) mixed with cream from buffalo, cow and goat milks and with whey cream. Cheeses from different treatments were stored in pickle at 10 plus or minus 2 °C for 90 days and analysed after 15 and 30 days and then at monthly intervals. Mixed RSM and goat milk cream showed the highest rennet coagulation time, control milk had the highest curd tension and mixed RSM and whey cream showed the highest syneresis compared to other treatments. Fresh Domiati cheese from mixed RSM and whey cream had the highest titratable acidity and fat content and lowest pH compared to other treatments. On the other hand, cheese from mixed RSM and cow milk cream showed the highest yield compared to other treatments. The total solids, fat, total nitrogen and water soluble nitrogen contents of Domiati cheese from mixed RSM and goat milk cream were higher than that of other treatments. Domiati cheese from RSM and all types of cream had the highest total volatile fatty acids (TVFA) than the control. The cheese made from mixed buffalo and cow milk (control) and mixed RSM and buffalo milk cream gained higher scores than cheeses from other treatments.

Arora, S., P. Ranjan, G. S. Sharma, J. S. Sindhu, G. Singh, A.K. Singh, and V. K. Kansal. *Dairy Chemistry Division, National Dairy Research Institute, Karnal - 132 001, Haryana, India. Effect of calcium fortification on heat stability and physicochemical properties of mixed (cow and buffalo 1:1) milk. Indian Journal of Dairy Science* (2005). **58** (4) : 242-246

Calcium enrichment of food and dairy products is gaining interest because of the increased awareness on the importance of higher calcium intake. Milk possesses all the prerequisites for an ideal carrier vehicle. This study was conducted to fortify calcium in milk in order to prepare a calcium enriched milk for individuals who could not ingest enough calcium to meet the daily minimum requirements. The effect of calcium fortification on the heat stability and physicochemical properties of mixed cow and buffalo milk was investigated. Milk was fortified with calcium at the rate of 50 mg/100 ml using 3 salts of calcium (calcium chloride, calcium lactate and calcium gluconate). Fortification of milk with these salts destabilized the milk drastically due to decrease in its pH. However, the calcium fortified milk was stabilized by adjusting its pH with disodium phosphate, which restored its heat stability. Fortification of milk with calcium and adjustment of pH with a base caused a significant increase in viscosity and a significant decrease in the curd tension. Higher calcium in the aqueous phase might lead to higher absorption of the added salts.

Thomas, R., A.S.R. Anjaneyulu and N. Kondaiah. *Division of Livestock Products Technology, Indian Veterinary Research Institute, Izatnagar, Bareilly (U.P.) 243 122, India.* **Quality and shelf life evaluation of emulsion and restructured buffalo meat nuggets at cold storage (4 plus or minus 1 deg C)** *Meat Science* (2006). **72** (3) : 373-379

The study was aimed at comparing the physico-chemical characteristics and texture profile of emulsion and restructured buffalo meat nuggets (BMN) and assessing their shelf life at refrigeration temperature (4 plus or minus 1 deg C). The stability of restructured batter was significantly lower than that of the emulsion form. Emulsion nuggets (EN) had significantly higher product yield, fat content and calories while restructured nuggets (RN) had significantly higher moisture and protein contents. Texture profile analysis revealed that RN had significantly higher cohesiveness, gumminess, chewiness and shear force values. Differences in TBARS values for emulsion and restructured nuggets were not significant at any particular storage time. Throughout storage, counts for mesophilic, psychrotrophic and coliforms did not exceed log₁₀ 3.09 and 3.44 cfu/g, log₁₀ 2.23 and 2.11 cfu/g, log₁₀ 1.30 and 1.30 cfu/g for emulsion and restructured buffalo meat nuggets, respectively. In spite of a higher overall acceptance for EN initially, panelists rated them considerably lower compared to RN during subsequent storage. Buffalo meat nuggets were acceptable for at least 20 days in cold storage (4 plus or minus 1 deg C) under aerobic conditions in polypropylene bags.

Mehta, S. and C.S. Nautiyal. *Microbiology Group, National Botanical Research Institute, P.O. Box 436, Rana Pratap Marg, Lucknow 226 001, India.* **A method of distinguishing human and bovine milk samples based on soluble phosphate content.** *Food Control* (2006). **17**(3) : 180-182.

The present study provides a rapid method for distinguishing human and bovine milk samples. The method is based on quantifying soluble phosphate content in milk. Sahiwal cows' milk was closer to human mothers' milk, due to its significantly lower soluble phosphate level, compared to the milk from Holstein cow and buffalo. Therefore, when human mothers' milk is not available, among the bovine milk, Sahiwal cows' milk may be a better alternative, then with from the Holstein cow or buffalo, for the preparation of infant formula. The method may be useful for quality control of commercially available milk samples for preparing infant formulation.

PHYSIOLOGY

Rastogi, S. K. and M. Mohsin. *Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttaranchal 263 145, India.* **Comparative evaluation of endogenous and exogenous creatinine clearance for assessment of glomerular filtration rates in buffalo calves.** *Indian Journal of Animal Sciences* (2005). **75** (10) : 1144-1147.

Female buffalo calves (4) were studied for renal clearance of endogenous and exogenous (creatinine infused at 15.0 mg/kg and 40.0 mg/kg body wt) creatinine clearance and compared with inulin clearance. Both dose rates provided better estimates with respective values of glomerular filtration rates (GFR) 187.7 plus or minus 9.0, 211.0 plus or minus 6.6 ml/min. Respective values for endogenous creatinine and inulin clearance were 203.0 plus or minus 8.8 and 180.1 plus or minus 7.0 ml/minute. Creatinine clearance at low dose rate level gave better significant positive correlation ($r=0.845$) compared to higher dose rate level ($r=0.187$), which was non-significant. Data indicated that infusion of exogenous creatinine at 15.0 mg/kg body weight could be used to assess glomerular filtration rates in buffalo calves in place of more tedious and cumbersome inulin clearance.

Shree, K.Y.L., R. V. Prasad, K. V. Jamuna, K. Kakade and M. Dhoolappa. *Department of Veterinary Anatomy, Veterinary College, Hebbal, University of Agricultural Sciences, Bangalore 560 024, Kamataka, India.* **Histochemistry of extraocular muscles in buffalo (*Bubalus bubalis*).** *Buffalo Journal* (2005). **1** : 67-74.

The histochemical findings and the morphological features were important for characterizing the extraocular muscles (EOMs) of buffalo as slow and fast muscles. The existence of three types of muscle fibres in highly organized striated muscles was clearly distinguished by the difference in their histochemical activity. Histochemical studies on buffalo EOMs was carried out on lipids, glycogen, myoglobin content and enzymes like succinic dehydrogenase and phosphorylase. Lipid content showed strong reactions in narrow fibres, moderate in intermediate and weak reaction in broad fibres. Glycogen was moderate in broad fibres and almost negative in narrow fibres. Myoglobin concentration was more in narrow fibres compared to broad fibres. Succinic dehydrogenase activity (SDH) was higher in narrow fibres, lower in broad fibres and showed intermediate reaction in intermediate fibres where as phosphorylase activity was very strong in broad fibres, strong in intermediate and moderate in narrow fibres.

REPRODUCTION

Gupta, P. S. P., J. P. Ravindra, S. Nandi, H. M.Raghu and K. P. Ramesha. *Veterinary College, University of Agricultural Sciences, Bangalore, 560 024, India.* **Isolation of an oocyte stimulatory peptide from the ovarian follicular fluid of water buffalo (*Bubalus bubalis*).** *Asian-Australasian Journal of Animal Sciences* (2005). **18** (11) : 1557-1563.

Ovarian follicular fluid contains both stimulatory and inhibitory agents that influence the growth and maturation of oocyte. In the present study, an attempt was made to isolate and study the biological properties of ovarian follicular fluid peptide(s) in buffaloes. Bubaline ovarian follicular was made steroid and cell-free. A protein fraction was obtained by saturation (30-35% level) of the follicular fluid with ammonium sulfate. The protein fraction was purified with Sephadex-G 50 gel filtration chromatography and a single peak was obtained in the eluant volume, which was lyophilized. SDS-PAGE of the lyophilized fraction revealed a single band and the molecular weight of the peptide was 26.6 kDa. The peptide stimulated the cumulus cell expansion and *in vitro* maturation rate of oocytes in buffaloes in a dose dependent manner when it was incorporated at different dose levels (0, 10, 25, 50, 100 and 1,000 ng ml of maturation medium). The basic culture medium consisted of TCM 199 with Bovine serum albumin (0.3%). The *in vitro* maturation rates were comparable to those obtained with a positive control medium (TCM 199+20 ng EGF ml⁻¹+steer serum (20%)). Further purification and biological assays may throw more light on the nature and functions of this peptide.

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