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Neonatal calf diarrhoea: Cause and control

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Neonatal calf diarrhoea causes serious economic losses and assumes greater significance among various infections because of high mortality. Gupta *et al.* (2006) 23.72% prevalence of *Escherichia coli* (*E coli)* in neonatal diarrhoeic calves aged 0–7days. The role of trace elements viz. copper, selenium and cobalt in immunoresponsiveness and disease resistance has become well established (Suttle and Jones 1989). Copper deficiency syndrome in Punjab has been recognized in the form of nutritional haemoglobinuria, anaemia, chronic diarrhoea, infertility, bone disorders and immunoinsufficiency in dairy animals (Randhawa 1999).The present study was carried out to evaluate the effect of copper supplementation on the occurrence of colibacillosis in calves along with severity of diarrhoea in copper supplemented calves and calves obtained from the dams supplemented with copper in late pregnancy.

In the present study 132 healthy calves were selected and fed colostrum, dewormed with broad spectrum anthelmintic and given same feed. All the calves were maintained in calf shed, in individual calf pen. In the first phase 40 calves were kept as control and 42 calves were supplemented with single parental administration of copper glycinate in the brisket region (21 calves were administered copper glycinate @1 ml/calf and 21 calves with copper glycinate @ 2 ml/calf). In the second phase 50 pregnant cows and buffaloes were taken in their last stage of pregnancy (between 10 and 30 days before calving). Control group had 22 dams as and 28 were given injection of copper glycinate @ 2 ml/animal subcutaneously in the brisket region. All the calves were observed for clinical appearance of diarrhoea on day to day basis. The feacal samples from 112 diarrhoeic calves (both copper glycinate supplemented and control) were collected and screened for *E. coli.* Immediately after collection, a loopful of faecal sample was streaked on MacConkey Lactose Agar (MLA) and incubated at 37°C for 24 h. *E. coli* was confirmed as per Quinn *et al.* (1994). Isolates of *E. coli* were sent to National Salmonella and Escherichia Center, Central Research Institute, Kasauli, Himachal Pradesh for serotyping. The antibiogram was observed by disc diffusion technique (Cruickshank *et al.* 1975) and the resistance pattern determined.

The overall mortality due to diarrhoea in control calves was 22.5% with 25% mortality being recorded in buffalo calves and 20% in cow calves. In copper supplemented calves, the overall mortality decreased to 12.19% (8% mortatity in buffalo calves and 18.75% in cow calves). In dam control calves, the overall mortality was 36.36% with 50% mortality in buffalo calves and 28.57% in cow calves. On the other hand in dam supplemented calves the overall mortality came down to 10.71% (8.33% mortality in buffalo calves and 12.50% in cow calves). Similar findings regarding the mortality due to diarrhoea were reported by Basak *et al.* (1994) and Khan and Khan (1996). Sanders (1985) observed that the calves born to hypocupraemic dams were more susceptible to diarrhoea than calves born to normocupraemic dams. Wooliams *et al.* (1986) reported that high copper status animals show less severity when challenged with infection. Clement *et al.* (1995) have also reported the relation between serum copper concentration of dams and development of diarrhoea in their calves. Higher mortality in nonsupplemented control calves might be ascribed to impaired antibody production (Suttle and Jones 1986) and impaired ability of neutrophils to ingest the microorganisms (Boyne and Arthur 1986) during low copper status in animals.

The results of bacterial cultural isolation studies revealed 82.14% pure culture of *E coli* isolates and 17.86% non-*E. coli* cultures from faecal samples. The results of antibiogram (Table 1) revealed that amikacin was the most sensitive (84.31%) followed by enrofloxacin (68.63%), nitrofurantoin and streptomycin (64.7% each), pefloxacin and chloramphenicol (62.74% each) and furazolidone (50.86%). Sulphamethoxazole was least sensitive (3.92%) followed by amoxycillin (19.61%) and metronidazole (21.57%). Senstivity pattern of various drugs was comparable to reports

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Table 1. Antibiogram of *E. coli* isolates from diarrhoeic calves

Antibiotics	Number of isolates		Percentage sensitivity
	Sensitive	Resistant	
Amoxycillin	18	74	19.61
Amikacin	78	14	84.31
Co-trimoxazole	31	61	33.33
Chloramphenicol	58	34	62.74
Enrofloxacin	63	29	68.63
Furazolidone	52	40	56.86
Metronidazole	20	72	21.57
Neomycin	45	47	49.01
Nitrofurantoin	60	32	64.70
Nalidixic acid	40	52	43.14
Norfloxacin	40	52	43.14
Pefloxacin	58	34	62.74
Streptomycin	60	32	64.70
Sulphamethoxazole	4	88	3.92

by Mallick *et al.* (1988) and Peer *et al.* (1997). The results of serotyping of the 92 *E. coli* isolates from diarrhoeic dairy calves revealed that most prevalent serotype was rough type (10.87%) followed by untypable and serotype 08 (7.61% each), 0101 (6.52%), 095 and 041 (4.31% each). Most of the strains belong to O serogroup as previously reported by Kumar and Richaa (2003), Sharma *et al.*(2004) and Chatterjee and Kashyap (2006).

SUMMARY

Healthy calves (132) selected from an organized dairy farm to study neonatal calf diarrhoea revealed that single parenteral copper supplementation, both in neonatal calves at second day of birth and dams in late pregnancy helped in reducing mortality due to diarrhoea. The comparative study also revealed that mortality was decreased by 12.19% in copper supplemented calves, whereas in dam supplemented calves, the mortality was reduced to 10.71% indicating that single copper glycinate administration in dams during advanced pregnancy was more helpful in saving neonatal life from diarrhoea. *E. coli* is the major causative agent which causes neonatal calf diarrhoea and in the present study 82.14% pure culture of *E. coli* isolates from faecal samples have been obtained and most of the strains belong to O serogroup.

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