SHORT COMMUNICATION

Efficacy of Commonly Used Anti-coccidial Drugs against Coccidiosis in Buffalo Calves

Aniket B. Navkar[1], Bapurao S. Khillare[1], Sridhar Y. Shirale[1], Babasaheb W. Narladkar[2], Gajendra N. Bhangale[2]*

Abstract

The present study was designed to evaluate the efficacies of commonly used anti-coccidial drugs *viz.* Sulphadimidine, Amprolium and Toltrazuril against coccidiosis in buffalo calves. Eighteen buffalo calves under 6 months of age naturally infected with coccidiosis were randomly divided into three groups (6 calves each). Calves were administered with standard doses, and the efficacy of drugs were assessed by observing the oocysts per gram of feces and weight gain. It was observed that all three treatments showed a significant impact in treating coccidiosis and weight gain. Toltrazuril appeared to be comparatively more efficacious than sulphadimidine and amprolium in terms of reduction in OPG and weight gain. However, amprolium and sulphadimidine showed faster efficacy than toltrazuril in reducing the coccidial burden in buffalo calves

Keywords: Amprolium Buffalo calves, Coccidia, Drug efficacy, Sulphadimidine, Toltrazuril.

Ind J Vet Sci and Biotech (2022): 10.21887/ijvsbt.18.2.31

Introduction

Healthy calf rearing is important for economic growth as well as essential for maintaining a good quality germplasm (Tiwari *et al*., 2009). The success of buffalo dairy farming depends significantly on the control of calf mortality. Calf mortality might result from diarrhea of multifactorial etiologies ranging from bacteria, viruses, parasites to management and nutritional factors. Amongst parasitic diseases, coccidiosis is one of the major problems in buffalo calves due to the exposure of oocysts of *Eimeria* spp. in their early life through persistent viable oocysts in calf pens and sheds or from infected healthy animals with sub-clinical infections (Ahmed and Hassan, 2007; Bastianetto *et al*., 2007).

Coccidiosis in calves is distributed worldwide and is caused by many species of Eimeria, which invade the intestinal epithelial cells (Dubey, 2018; Morgoglione *et al*., 2020). The most prevalent species of Eimeria in ruminants include *Eimeria bovis, E. zuernii, E. auburnensis, E. Canadensis, E. alabamensis E. ellipsoidalis*, and *E. wyomingensis*.

Several anti-coccidial drugs are effective in the treatment and control of coccidiosis in calves viz. Toltrazuril (Epe *et al*., 2005), Sulphadimidine (Svensson, 1998) and Amprolium (Slater *et al*., 1970). These drugs have varied therapeutic efficacy, and some also attended drug resistance accompanied by poor immunity in infected calves (Odden *et al.,* 2018). The present study was designed to compare the efficacy of three commonly used drugs against coccidia in buffalo calves, particularly in reducing the oocysts per gram of feces (OPG Count) and weight gain.

Materials and Methods

The present study was conducted on 18 buffalo calves under 6 months of age, naturally infected with coccidia from Instructional Livestock Farm Complex, COVAS, Udgir to assess the comparative efficacy of commonly used anti-coccidial medicines. The animals were selected based on the severity of the infection and were divided into three groups. Group T1, buffalo calves were treated with Sulphadimidine @110 mg/kg orally once daily for five days, Group T2 , buffalo calves were treated with Amprolium @20 mg/kg orally for five days and Group T3 calves were treated with oral suspension of Totrazuril @15 mg/kg for five days.

The comparative efficacy of drugs was evaluated following the Fecal Egg Count Reduction Test – Dash Method (FECRT) (Dash *et al*.,1988). Accordingly, the Fecal oocyst count (OPG) on days 0, 7, 14, and 21 post-treatment were obtained following Stoll's dilution method. Also, the average weight gain in each group of calves was recorded at weekly intervals. The statistical significance of the observations was assessed through factorial design.

[1]Department of Parasitology, College of Veterinary and Animal Sciences, Udgir, Maharashtra, India

[2]Department of Parasitology, College of Veterinary and Animal Sciences, Parbhani, Maharashtra, India

Corresponding Author: Gajendra N. Bhangale, Department of Parasitology, College of Veterinary and Animal Sciences, Parbhani, Maharashtra, India, e-mail: gajumanu@gmail.com

How to cite this article: Navkar, A.B., Khillare, B.S., Shirale, S.Y., Narladkar, B.W., & Bhangale, G.N. (2022). Efficacy of Commonly Used Anti-coccidial Drugs against Coccidiosis in Buffalo Calves. Ind J Vet Sci and Biotech. 18(2), 135-137.

Source of support: Nil

Conflict of interest: None.

Submitted: 30/09/2021 **Accepted:** 12/03/2022 **Published:** 10/04/2022

Table 1: Comparative efficacy of drugs on OPG count in calves naturally infected with coccidia

Drugs under trial /Group	*Day 0*	*Week 1*	*Week 2*	*Week 3*	*Week 4*
Sulphadimidine/ T1	3016.67 ± 221.23^{ax}	100.00 ± 100.00^{bx} (0-100)	50 ± 50^{b} (0-300)	0.00^{b}	0.00^{b}
Amprolium/ T2	3333.33 ± 317.98^{ay} (2800-4900)	1316.67 ± 488.137^{by} (0-3100)	0.00^{c}	0.00^{c}	0.00^{c}
Toltrazuril/ T3	3266.67 ± 385.285^{az} (1800-4600)	216.67 ± 101.379^{bx} (0-500)	33.33 ± 33.33^{b} (0-200)	16.67 ± 16.67^{b} (0-100)	0.00^{b}
CD for treatment	248.33				

Different Superscripts a, b, c show significant differences among the rows (within days)
Different Superscripts x, y, z show significant differences among columns (among treatments)

Table 2: Effect of selected treatments on weight gain (in kgs) in coccidia positive buffalo calves

Drug under trial /Group	*Week 1*	*Week 2*	*Week 3*	*Week 4*
Sulphadimidine/T1	2.712 ± 0.538^{ax} (1-4.8)	0.350 ± 0.184^{bx} (0 - 1.1)	0.017 ± 0^{bx} (0-0)	0.142 ± 0.069^{bx} (0 – 0.4)
Amprolium/ T2	1.017 ± 0.336^{ay} (0-2.5)	0.233 ± 0.196^{bx} (0-1.2)	0.217 ± 0.178^{bx} (0 – 1.1)	0.808 ± 0.679^{ax} (0.05–4.2)
Toltrazuril/T3	1.850 ± 0.636^{abz} (0-3.9)	2.367 ± 1.412^{ay} (0-9.3)	0.383 ± 0.130^{bx} (0-0.8)	0.217 ± 0.178^{bx} (0-1.1)

Different Superscripts a, b, c show significant difference among the rows (within weeks)
Different Superscripts x, y, z show significant difference among columns (within treatments)

Ethical approval for this study was obtained by the Institutional Animal Ethics Committee vide Project No. 07 dated 16/12/2020.

Results and Discussion

Three treatments were instituted for judging the efficacy of commonly used drugs against coccidiosis in buffalo calves based on reduction of OPG count and weight gain. The results of the drug treatment are presented in Tables 1 and 2.

Effect of Drugs on Reduction in OPG Count

The comparative efficacy of selected three drugs in treating the coccidial infection in buffalo calves showed that OPG count was reduced significantly after the first week of treatment in all the treatment groups; however, in sulphadimidine and toltrazuril treated groups, the OPG reduction was recorded higher compared to amprolium treated group. It was also found that the time taken for reducing the OPG count to zero was more in the toltrazuril group than the other two groups, wherein the OPG count became zero in the second and third week in the amprolium and sulphadimidine treated group, respectively. On the contrary, there was a gradual decrease in OPG count during the first three weeks in the toltrazuril treated group, which becomes zero during the fourth week of treatment. The results imply that sulphadimidine and amprolium are more effective in controlling the shedding of coccidia oocysts from buffalo calves as compared to toltrazuril.

Effect of Drugs in Achieving Weight Gain

Regarding the effect of treatments on weight gain of coccidia-infected calves, it was found that sulphadimidine proved better on day 7th, post-treatment, which helped achieve significant weight gain. Treatment with amprolium and toltrazuril also helped to improve the weight gain, although comparatively lower than sulphadimidine. However, the average weight gain was recorded higher in toltrazuril treated groups than amprolium and sulphadimidine treated groups.

It was observed that toltrazuril showed comparatively better efficacy in treating the clinical cases of coccidiosis in bubaline calves. The variation in therapeutic response might be attributed to the variations due to the level of infections as well as individual physiological status.

Toltrazuril is the most effective drug among these as indicated by earlier workers (Epe *et al.,* 2005, Sultana *et al.,* 2017). The present study results indicated that Toltrazuril was a highly efficacious drug. There was a significant reduction in oocyst shedding and a gradual and consistent weight gain in calves. The treatment with Toltrazuril was highly beneficial for the animals regarding the health status (occurrence of diarrhea) and excretion of oocysts of pathogenic *Eimeria*sp. (El-Ghoneimy and El-Shahawy, 2017) The anti-coccidial effect of a single metaphylactic oral treatment with toltrazuril was earlier demonstrated under various field conditions (Iqbal *et al*., 2013). The role of toltrazuril in the improvement of gut health through enhancing antibody production and maintaining intestinal integrity and function was demonstrated earlier by Grief (2000).

Conclusion

Among the drugs assessed for their efficacy against coccidia in buffalo calves, it is concluded that toltrazuril appeared to be comparatively more efficacious than sulphadimidine and amprolium in terms of reduction in oocysts shedding and

weight gain. It was also found that 3-4 weeks were required to completely stop the occysts shedding in calves when treated with these drugs.

Acknowledgments

The cooperation provided by the Associate Dean, COVAS, Udgir, Maharashtra Animal and Fishery Sciences University, Nagpur, to carry out the current research is duly acknowledged.

References

Ahmed, W. M. & Hassan, S. E. (2007). Applied studies on coccidiosis in growing buffalo-calves with special reference to oxidant/ antioxidant status. *World Journal of Zoology, 2(2),* 40-48.

Bastianetto, E., Filho, E. J. F., Lana, A. M. Q., Cunha, A. P., Teixeira, L. V., Bello, A. C. P. P., & Leite, R. C. (2007). Epidemiology of *Eimeria* sp. infection in buffaloes (*Bubalusbubalis*) bred in Minas Gerais, Brazil. *Italian Journal of Animal Science, 6(2),* 911-914.

Dash, K.M., Hall, E. & Barger, I.A. (1988). The role of arithmetic and geometric mean worm egg counts in faecal egg count reduction tests and in monitoring strategic drenching programs in sheep. *Australian Veterinary Journal, 65(2),*66-8.

Dubey, J.P. (2018). A review of coccidiosis in water buffaloes (*Bubalusbubalis*). *Veterinary Parasitology, 256*, 50-57.

El-Ghoneimy, A. & El-Shahawy, I. (2017). Evaluation of amprolium and toltrazuril efficacy in controlling natural intestinal rabbit coccidiosis. *Iranian Journal of Veterinary Research,18(3),* 164-169.

Epe, C., von Samson–Himmelstjerna, G., Wirtherle, N., Von Der Heyden, V., Welz, C., Beening, J., & Krieger, K. (2005). Efficacy of toltrazuril as a metaphylactic and therapeutic treatment of coccidiosis in first-year grazing calves. *Parasitology Research*, *97*(1), S127-S133.

Ghanem, M.M., Radwaan, M.E., Moustafa, A.M. &Ebeid, M.H. (2008). Comparative therapeutic effect of toltrazuril, sulphadimidine and amprolium on *Eimeriabovis* and *Eimeriazuernii* given at different times following infection in buffalo calves (*Bubalusbubalis*). *Preventive Veterinary Medicine,84(1-2*), 161-70.

Greif, G. (2000). Immunity to coccidiosis after treatment with toltrazuril. *Parasitology Research,86(10)*, 787-90.

Iqbal, A., Tariq, K.A., Wazir, V.S. & Singh, R. (2013).Antiparasitic efficacy of Artemisia absinthium, toltrazuril and amprolium against intestinal coccidiosis in goats. *Journal of Parasitic Diseases,37(1),*88-93.

Morgoglione, M.E., Bosco, A., Maurelli, M.P., Alves, L.C., Saralli, G., Bruni, G., Cringoli, G. &Rinaldi, L. (2020). A 10-Year Surveillance of *Eimeria* spp. in Cattle and Buffaloes in a Mediterranean Area. *Frontiers in Veterinary Science, 7,* 410.

Odden, A., Denwood. M.J., Snorre, S., Robertson, J.L., Ruiz, A., Hamnes, I.S., Hektoen, L. &Enemark, H.L. (2018).Field evaluation of anti-coccidial efficacy: a novel approach demonstrates reduced efficacy of toltrazuril against ovine *Eimeria* spp. in Norway. *International Journal of Parasitology Drugs and Drug Resistance,8,*304–11.

Slater, R.L., Hammond, D.M. & Miner, M.L. (1970).*E.bovine* development in calves treated with thiamine metabolic antagonist (Amprolium) in feed. *Transactions of AmericanMicrobiology Society, 89*, 55-65.

Sultana, R., Ilyas, S.C.H., Maqbool, A., Iqbal, Z.C.H., Ahmad, M.D. &Ahmad, Z.M.(2017). Chemotherapy of Coccidiosis in Calves. *Archives on Veterinary Science and Technology, 129.*

Svensson, C. (1998). Prevention of *Eimeriaalabamensis*coccidiosis by a long-acting baquiloprim/sulphadimidine bolus. *Veterinary parasitology*, *74(2-4),* 143-152.

Tiwari, R., Sharma, M.C. & Singh, B.P. (2009). Animal feeding and management strategies in the commercial dairy farm. *Indian Journal of Animal Sciences, 79(11),*1183-1184.