



Effects of De-worming on the Health Status and Milk Yield of Kenkatha Cattle in Bundelkhand Region of Uttar Pradesh

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ABSTRACT

The objective of present experiment was to assess the effect of de-worming on the health status and milk yield of Kenkatha cattle in the Bundelkhand region of Uttar Pradesh. The study was carried out in two farms of the Banda University of Agriculture & Technology (BUAT) i.e. Kenkatha Conservation and Nandi Nandini Abhyaran Unit. A total of 40 cattle were randomly selected from above two farms. The twenty cattle were routinely de-wormed with Al-bendazole (treatment) as per manufacturer instructions and rest 20 animals had never been treated (control). The experiment was carried out for period of 4 month. We measured the initial and final body weight to calculate the growth rate. The body condition scoring (BCS) was done on 1 to 9 scale. Blood samples were taken from each animal to measure the haemoglobin level. The milk yield record of 12 dewormed and 14 control animals was collected on a regular basis. The growth rates (g/d) for control and treatment were 104.17 ± 14.8 and 183.33 ± 16.2 , respectively. The final BCS at end of trial were found 3.5 ± 0.7 and 5.2 ± 0.6 for control and treatment cow respectively. The growth rate and BCS were observed to be significantly impacted by deworming ($P < 0.05$ and $P < 0.01$) respectively. Milk yields (kg/day) were found significantly ($P < 0.05$) between the groups. The level of haemoglobin (Hb) was also found significant ($P < 0.05$). Based on the aforementioned data it can be concluded that routine deworming of cattle significantly improves their health, resulting in increased growth and milk yield in this region.

HIGHLIGHTS

- ❶ The growth rate, BCS and Hb levels were observed to be significantly impacted by deworming.
- ❷ Routine deworming of cattle significantly improves their health, resulting in increased growth and milk yield in this region.

Keywords: Bundelkhand, De-worming, Health, Kenkatha, Milk yield

Gastrointestinal (GI) parasites are a world-wide concern. (Regassa *et al.*, 2006). These parasites are present in the gastrointestinal tracts of ruminants throughout the year, although their incidence is higher during the rainy season (Marskole *et al.*, 2016). The primary causes of GI parasitism in livestock are protozoa and helminths (Pinilla León *et al.*, 2019). The growth, development, and survival of these parasites, including eggs, larvae, cysts, and oocysts, or their intermediate hosts, are mostly influenced by the climate, particularly temperature and humidity (Thanasuwan *et al.*, 2021). These infections are regarded as one of the most significant challenges to efficient cattle farming. The infection causes subclinical or chronic

infections that reduce feed intake and affect feed utilization efficiency, which leads to financial losses (Renaldi *et al.*, 2011; Bary *et al.*, 2018). In addition, parasitic infections can result in decreased general health, slowed growth, decreased productivity, decreased milk production, abortion, and the expense of preventive measures. They can also lower the ability to withstand disease, which can ultimately increase mortality (Silvestre *et al.*, 2000).

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An estimated 10% of animals worldwide may die from parasite infections each year (Chavhan *et al.*, 2008). Because the majority of infected animals exhibit clinical indications that are less obvious during their productive lives and the effects of gastrointestinal parasitism are slow and persistent, the issues are frequently disregarded and ignored despite the enormous losses caused by the disease (Raza *et al.*, 2010; Zafar *et al.*, 2022).

Kenkatha cattle, which are native to Uttar Pradesh's Bundelkhand region, are known for their capacity to adapt and persevere under challenging environmental circumstances. However, parasitic infections, especially gastrointestinal parasites, pose serious health risks to them, as they can result in decreased productivity, ill health, and in extreme situations, death (Hussain *et al.*, 2020). Although various studies on effect of de-worming on health status of calves have been documented, however very less study is available so far on health status particularly on this breed in Bundelkhand region. Keeping these viewpoints in mind, the current study was carried out to assess the effect of deworming on the general health and milk production of Kenkatha cattle in Bundelkhand region.

MATERIALS AND METHODS

Study area

The study was carried out at two farms i.e. Nandi Nandini Abhyaran and Kenkatha Conservation Unit farms of the Banda University of Agriculture & Technology (BUAT). The BUAT campus spans 383.64 hectares and is situated on the Mahoba–Fatehpur road National Highway (NH 335) in Banda, between latitudes 24°53' and 25°55'N and longitudes 80°07' and 81°34' E.

Experimental design

A total of 40 Kenkatha cattle were randomly selected from above two farms for this study. The 20 animals were routinely de-wormed with Al-bendazole (treatment) as per manufacturer instructions and rest 20 animals had never been treated (control). The age of animal ranged from 1.5-4 year. The study was conducted for a period of 4 months. All of the animals were confined at night and grazed during the daytime. Wheat straw was given to the animals twice a day. Concentrate feed was given to milking animals.

Data collection

Health indicators such as body weight, daily weight gain, body condition score (BCS), and hemoglobin levels were recorded for each animal. There were 14 milking cows in the control group and 12 in the treatment group. Throughout the investigation, routine measurements of the milk yield of the treated and control animals were taken.

Estimation of BW

Initial body weight of the animals was taken immediately before the onset of study and final body weight was taken at the end. Schaeffer's formula (1), which is frequently utilized by livestock producers, was utilized to estimate and compute the body weight of the cow (Wangchuk *et al.*, 2018).

$$\text{Weight (lbs)} = \text{Length (inch)} \times (\text{Chest Girth (inch)}^2) / 300 \quad (1)$$

Body condition score (BCS)

A scale from 1 to 9 was used to score the body condition, with 1, denoting extreme emaciation and 9, extreme obesity. Fat thickness in the ribs, tail head, brisket, hooks and pins, muscling in the round and shoulder, and spine (vertebrae) is used to evaluate animals. Body condition can be scored using visual indicators adapted from Herd and Sprott (1986) as mentioned in Table 1.

Estimation of haemoglobin

Blood samples from each animal were collected from Juglar vein using 5 ml syringes and 18-gauge needles. The collected blood was put into appropriately labeled EDTA vials. The estimation of Hemoglobin was determined as described by Sastry (1989) and Chakrabarti *et al.* (1994).

Statistical Analysis

The data were analyzed using SPSS version 26. Descriptive statistics were calculated, and inferential statistics, including t-tests, were used to compare health indicators pre- and post-deworming. P-values less than 0.05 were regarded as statistically significant.

Table 1: Body condition scoring in cattle

	Physical Attribute						
	BCS	Spine	Ribs	Hook/Pin	Tail head	Brisket	Muscling
Thin	1	Visible	Visible	Visible	No Fat	No Fat	None/Atrophy
	2	Visible	Visible	Visible	No Fat	No Fat	None/Atrophy
Borderline	3	Visible	Visible	Visible	No Fat	No Fat	None
	4	Slightly Visible	Fore ribs Visible	Visible	No Fat	No Fat	Full
Optimum condition	5	Not Visible	1 or 2 may be visible	Visible	No Fat	No Fat	Full
	6	Not Visible	Not Visible	Visible	Some Fat	Some Fat	Full
Over conditioned	7	Not Visible	Not Visible	Slightly Visible	Fat	Fat	Full
	8	Not Visible	Not Visible	Not Visible	Abundant Fat	Abundant Fat	Full
	9	Not Visible	Not Visible	Not Visible	Extremely Fat	Extremely Fat	Full

RESULTS AND DISCUSSION

Effect of de-worming on health status

The effects of de-worming on the various indicators of health in Kenkatha cattle are presented in Table 2.

Table 2: Mean±SD of various health indicators of Kekatha cattle

Sl. No.	Parameters	Control	Treatment
1	Initial BW (Kg)	207.9±12.8	223.3±10.7
2	Final BW (Kg)	220.4 ^a ± 15.2	245.3 ^b ± 13.4
3	Rate of gain (g/d)	104.17 ^a ±14.8	183.33 ^b ±16.2
4	Initial BCS	3.3± 0.5	4.2± 0.8
5	Final BCS	3.5 ^a ± 0.7	5.2 ^c ± 0.6
6	Haemoglobin (Hb) g/dl	9.5 ^a ± 1.2	11.0 ^c ± 0.9

ab, ac Means with different superscripts within a row differ significantly (P<0.05) and (P<0.01) respectively.

Body weight and growth rate

The initial average body weight of treatment and control animals were 223.3±10.7 and 207.9±12.8 kg, respectively, while the final body weight was 245.3 ± 13.4 and 220.4±15.2 kg respectively for treated and control animals. Similar to our current findings, Islam *et al.*, (2006) conducted an experiment on indigenous zebu cattle in two selected villages in the Jessore area of Bangladesh and found that the body weight of the dewormed cows increased significantly (P<0.05). Saeed and Alsayeqh (2023) also performed an experiment in which four groups of Sahiwal cows (A, B, C, and D) were administered

herbal dewormer at 1000 mg/kg, 1200 mg/kg, and 1400 mg/kg along with a control group for 30 days. A significant (P<0.05) improvement in weight gain were seen, with average daily weight gains of 500±130.17, 683.33±100, 805.55±9.62, and 372.22±48.11, respectively.

The growth rate of treated and control animals were 183.33±16.2 and 104.17±14.8g daily (Table 2). The effect of de-worming on growth rate was found significant (P<0.05). Our results were consistent with the findings of Giasuddin *et al.*, (1995). They found that the body weight gain of cows, heifers, and calves increased significantly (P<0.01) after receiving de-worming treatment. Forbes *et al.* (2001) also found a significant impact of de-worming on growth rate. Martinez *et al.* (2001) found that daily weight gain was higher for the heifer calves that were dewormed. However, non-significant effects of de-worming on body weight gain were found by Mellado *et al.* (2004). It is possible that a parasitic infection causes a cow's body weight to gradually decrease (Högberg *et al.*, 2019) and/or that a weak immune system makes it difficult for the cow to fully reject worms or stop the establishment of larvae (Hendawy, 2018).

Body condition score (BCS)

The initial Body condition score (BCS) of treated and control animals was 4.2±0.8 and 3.3±0.5, while the final BCS were found 5.2±0.6 and 3.5±0.7 respectively. In comparison to the control group, the current study demonstrated a significant (P<0.01) improvement in BCS. BCS is a subjective indicator of energy reserve and a helpful tool for evaluating the nutritional health of dairy cows (Jilek *et al.*, 2008). The Improved weight



gains and BCS observed in treatment group in present study might be due to reduction in worm burden which enhances nutritional availability and feed uptake of the animals (Abbas *et al.*, 2020; Marufatuzzahan *et al.*, 2022). However, Davy *et al.* (2023) found no significant difference in the body condition score of young calves after treatment with dewormer, although reporting significant ($P<0.01$) weight increase. The differences in result might be due to breed, age, sex, climate, type of drug, method of drug administration in body etc.

Haemoglobin (Hb)

In the current study the Hb (g/dl) level was found 11.0 ± 0.9 and 9.5 ± 1.2 for treatment and treatment animal respectively (Table 2). Hb is an important measure used to determine the physiological state of farm animals (Etim, 2010). Hb levels in cows are typically between 10 and 15 g/dl (Merck Manual, 2012). In current study the de-worming significantly ($P<0.05$) improved the hemoglobin (Hb) level of the cattle. A decrease in worms can be directly linked to an increase in red blood cells and hemoglobin levels (Greeff *et al.*, 2020). The less Hb concentration in control as compared to de-wormed (treatment) cow is due to high parasitic load in control group, which feed on blood and have severe effects on circulatory blood cells leading to low Hb concentration and anemia (Rnajan *et al.*, 2022). Our current findings are supported by Saeed and Alsayeqh's (2003) results, which showed that the cattle receiving herbal dewormer at a dose of 1400 mg/kg had considerably ($P<0.05$) better hematological parameters than the control group. Because one gram of hemoglobin can bind 1.34 milliliters of oxygen, hemoglobin has an oxygen binding capacity (Dominguez *et al.*, 1981). It can bind (carry) up to four oxygen molecules (Costanzo, 2007). In agreement with our current findings, hemoglobin insufficiency reduces the blood's ability to carry oxygen, which may also have an impact on milk production performance. Furthermore, it has been discovered that animals with greater blood Hb concentrations are more adaptable than those with lower levels, suggesting that blood Hb concentration may serve as an index of environmental adaptability.

Effect of de-worming on milk yield

The result of deworming on milk yield of Kenkatha

cattle is given in Table 3. The average Milk yields were 2.17 ± 0.23 and 3.26 ± 0.18 kg/day for control and treatment cow respectively. Jileket *et al.* (2008) found that milk production of dairy cows correlates with their body condition, providing an effective approach for evaluating nutritional management. Because thin or overweight cows may be more likely to have a lower milk yield and a higher milk somatic cell count (SCC), it is imperative that dairy cows maintain ideal body condition in order to achieve superior herd and quantity milk production (Berry *et al.*, 2007). This is consistent with our present finding. Domecq *et al.* (1997) showed that insufficient energy reserves reduce milk yield.

Table 3: Mean $\pm$ SD of milk yield in Kekatha cattle

Type of animals	No of animals	Mean $\pm$ SD
Control	14	2.17 ^a $\pm$ 0.23
Treatment	12	3.26 ^b $\pm$ 0.18

^{ab}, Means with different superscripts within a column differ significantly ($P<0.05$).

In the current study, the authors found significant increase in milk production in cattle after anti-parasitic drug (Al-bendazole). Similarly, Thapa Shrestha *et al.* (2020) reported the average milk yield (liter/day/cow) increased significantly ($P<0.01$) which was 1.22 and 1.06 liters for treated cows and buffaloes respectively. Several other reports also suggest increased milk yield following anti-helminthic treatment in cows (Rehman *et al.*, 2010; Habib *et al.*, 2009). Forbes *et al.* (2004) observed that the daily milk yield of dewormed cows increased 2.35 liter as compared to control cows. However, Mellado *et al.* (2004) observed non-significant effect of deworming on milk yield of goats. The above differences in milk yield between the de-wormed and control cows indicate that milk production improved following gastrointestinal helminthiasis treatment. The aforesaid variations may be the consequence of the anti-helminthic drug which causes removal of the adult helminth worm resulting into decreased parasitic stress and increased milk production. These results are consistent with reports from Wales (Spence *et al.*, 1996), Austria (Köstenberger *et al.*, 2017) and Nepal (Thapa Shrestha *et al.*, 2020) that demonstrate a significant increase in milk output following deworming. The adverse effect of gastrointestinal helminthiasis on

milk production may be associated with a decrease in the gastrointestinal tract's ability to digest and absorb nutrients and substances, perhaps as a result of the helminths' damage. This could be further, linked with reduced appetite following infection as explained by Copeman, 2006 in ruminants.

CONCLUSION

The study concluded that routine deworming of cattle significantly improves their health, resulting in increased growth, body condition score and milk yield particularly in Bundelkhand region of U.P. Therefore, an effective deworming programme helps farmers to make profit by avoiding invisible productivity losses.

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REFERENCES

- Abbas, R.Z., Zaman, M.A., Sharif, M., Rafique, A., Saeed, Z., Siddique, F., Zaheer, T., Khan, M.K., Akram, M.S., Chattha, A.J. and Fatima, U. 2020. Anthelmintic effects and toxicity analysis of herbal dewormer against the infection of *Haemonchus contortus* and *Fasciola hepatica* in goat. *Pak. Vet. J.*, **40**(4): 455-460.
- Akanda, M.R., Hasan, M.M.I., Belal, S.A., Roy, A.C., Ahmad, S.U., Das, R. and Masud, A.A. 2014. A survey on prevalence of gastrointestinal parasitic infection in cattle of Sylhet division in Bangladesh. *Am. J. Phytomed. Clin. Therap.*, **2**(7): 855-860.
- Bary, M.A., Ali, M.Z., Chowdhury, S., Mannan, A., Nur e Azam, M., Moula, M.M., Bhuiyan, Z.A., Shaon, M.T.W. and Hossain, M.A. 2018. Prevalence and molecular identification of haemoprotozoan diseases of cattle in Bangladesh. *Adv. Anim. Vet. Sci.*, **6**(4): 176-182.
- Berry, D.P., Lee, J.M., Macdonald, K.A., Stafford, K., Matthews, L. and Roche, J.R. 2007. Associations among body condition score, body weight, somatic cell count, and clinical mastitis in seasonally calving dairy cattle. *J. Dairy. Sci.*, **90**(2): 637-648.
- Chakrabarti, R., Jung, C.Y., Lee, T.P., Liu, H. and Mookerjee, B.K. 1994. Changes in glucose transport and transporter isoforms during the activation of human peripheral blood lymphocytes by phytohemagglutinin. *J. Immun.*, **152**(6): 2660-2668.
- Charlier, J., Vande Velde, F., van der Voort, M., Van Meensel, J., Lauwers, L., Cauberghe, V., Vercruysse, J. and Claerebout, E. 2015. Econohealth: Placing helminth infections of livestock in an economic and social context. *Vet. Parasitol.*, **212**(1-2): 62-67.
- Chavhan, P.B., Khan, L.A., Raut, P.A., Maske, D.K., Rahman, S., Podchalwar, K.S. and Siddiqui, M.F.M.F. 2008. Prevalence of nematode parasites of ruminants at Nagpur. *Vet World.*, **1**(5): 140.
- Copeman, D.B. 2006. *Haemonchus contortus* and *Trichostrongylus colubriformis* in pen-trials with Javanese thin tail sheep and Kacang cross Etawah goats. *Vet. Parasitol.*, **135**(3-4): 315-323.
- Costanzo, L.S. 2007. *Fisiologia (Physiology)*. Hagerstown, MD: Lippincott Williams and Wilkins.
- Davy, J.S., Forero, L.C., Strickler, S., Gillespie, J. and Maier, G.U. 2023. Comparison of deworming strategies for pre-weaned beef calves. *Vet. Parasitol.*, **322**: 110005.
- De Villota, E.D., Carmona, M.G., Rubio, J.J. and de Andres, S.R. 1981. Equality of the *in vivo* and *in vitro* oxygen-binding capacity of haemoglobin in patients with severe respiratory disease. *Br. J. Anaesth.*, **53**(12): 1325-1328.
- Domecq, J.J., Skidmore, A.L., Lloyd, J.W. and Kaneene, J.B. 1997. Relationship between body condition scores and milk yield in a large dairy herd of high yielding Holstein cows. *J. Dairy. Sci.*, **80**: 101-112.
- Etim, N.N. 2010. Physiological and reproductive responses of rabbit does to *Aspilaafricana*. *Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria*.
- Forbes, A.B., Huckle, C.A. and Gibb, M.J. 2004. Impact of eprinomectin on grazing behaviour and performance in dairy cattle with sub-clinical gastrointestinal nematode infections under continuous stocking management. *Vet. Parasitol.*, **125**(3-4): 353-364.
- Giasuddin, M., Islam, M.M., Khan, E.H. and Kamal, A.H.M. 1995. Cattle health improvement through deworming. *Bangladesh Veterina.*, **12**: (1-2): L3-15.
- Greeff, J.C., Liu, S., Palmer, D. and Martin, G.B. 2020. Temporal changes in circulatory blood cell parameters of sheep genetically different for faecal worm egg count and diarrhoea from late summer to spring in a Mediterranean environment. *Anim. Prod. Sci.*, **60**(13): 1630-1642.
- Habib, M.A., Hossain, M.S. and Bhuiyan, A.K.F.H. 2009. Impact of urea-based diets on production of Red Chittagong cattle. *Bangla. Vet.*, **26**(2): 74-79.
- Hendawy, S.H. 2018. Immunity to gastrointestinal nematodes in ruminants: effector cell mechanisms and cytokines. *J. Parasit. Dis.*, **42**(4): 471-482.



- Herd, D.B. and Sprott, L.R. 1998. Body condition, nutrition and reproduction of beef cows.
- Högberg, N., Lidfors, L., Hesse, A., Segerkvist, K.A., Herlin, A. and Höglund, J. 2019. Effects of nematode parasitism on activity patterns in first-season grazing cattle. *Vet. Parasitol.*, **276**: 100011.
- Hussain, Z., El-Omar, E. and Lee, Y.Y. 2020. Dual infective burden of *Helicobacter pylori* and intestinal parasites: Good or bad news for the host. *Indian J. Gastroenterol.*, **39**: 111-116.
- Ico-Gómez, R., González-Garduño, R., Ortiz-Pérez, D., Mosqueda-Gualito, J.J., Flores-Santiago, E.D.J., Sosa-Pérez, G. and Salazar-Tapia, A.A. 2021. Assessment of anthelmintic effectiveness to control *Fasciola hepatica* and paramphistome mixed infection in cattle in the humid tropics of Mexico. *Parasitology*, **148**(12): 1458-1466.
- Islam, S.S., Mondal, S.C. and Ershad S.M.E. 2006. Effects of deworming on the growth and milk yield of indigenous cattle. *South Asian J. Agric.*, **1**(2): 101-103.
- Jílek, F., Pytloun, P., Kubešová, M., Štípková, M., Bouška, J., Volek, J., Frelich, J. and Rajmon, R. 2008. Relationships among body condition score, milk yield and reproduction in Czech Fleckvieh cows. *Czech J. Anim. Sci.*, **53**(9): 357-367.
- Köstenberger, K., Tichy, A., Bauer, K., Pless, P. and Wittek, T. 2017. Associations between fasciolosis and milk production, and the impact of anthelmintic treatment in dairy herds. *Parasitol. Res.*, **116**: 1981-1987.
- Manual, M. 2012. Haematologic reference ranges. *Mareck Veterinary Manual*.
- Marskole, P., Verma, Y., Dixit, A.K. and Swamy, M. 2016. Prevalence and burden of gastrointestinal parasites in cattle and buffaloes in Jabalpur, India. *Vet. World.*, **9**(11): 1214-1217.
- Martínez, X., Plaza, J., Ibalmea, R. and Enríquez, A.V. 2001. Effect of deworming and supplementation with urea on heifer calves. *Pastos y Forrajes*, **24**: 339-346.
- Marufatuzzahan, M., Khan, N.A., Hasan Khan, M.M. and Chowdhury, T.A. 2022. Effects of turmeric and garlic on the intestinal parasitic prevalence of cattle. *Res. Agri. Vet. Sci.*, **6**(1): 14-21.
- Mellado, M., Gonzalez, H., Garía, J.E. and Garcia, R. 2004. Anthelmintic treatment of goats on an arid range and its effect on milk production in late lactation. *J. Appl. Anim. Res.*, **25**(2): 91-95.
- Pinilla León, J.C. and Da Silva, N. 2019. Uropatía obstructiva en canino: reporte de caso clínico. *Rev. Investig. Vet. Perú.*, **30**(4): 1830-1836.
- Rahman, M.M. and Samad, M.A. 2010. Prevalence of subclinical gastro-intestinal parasitosis and their effects on milk production with therapeutic management in red chittagong cattle. *Bang. J. Vet. Med.*, **8**(1): 11-16.
- Raza, A.M., Murtaza, S., Bachaya H.A., Qayyum, A. and Zaman, M.A. 2010. Point Prevalence of *Toxocaravitulorum* in Large Ruminants Slaughtered at Multan Abattoir. *Pak. Vet. J.*, **30**(4): 242-244.
- Regassa, F., Sori, T., Dhuguma, R. and Kiros, Y. 2006. Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia. *Int. J. Appl. Res. Vet. Med.*, **4**(1): 51.
- Rinaldi, M., Dreesen, L., Hoorens, P.R., Li, R.W., Claerebout, E., Goddeeris, B., Vercruysse, J., Van Den Broek, W. and Geldhof, P. 2011. Infection with the gastrointestinal nematode *Ostertagia ostertagi* in cattle affects mucus biosynthesis in the abomasum. *Vet. Res.*, **42**: 1-11.
- Ranjan, A., Komal, A.G., Kumar, A., Kumar, D. and Sinha, M.K. 2022. Hemato-biochemical alteration in naturally infested goats with monieziosis. *Pharm. Innov. J.*, **9**: 1547.
- Saeed, Z. and Alsayeqh, A. 2023. Evaluation of anthelmintic, hematological and serum biochemical effects of herbal dewormer on the cattle. *Solven. Vet. Res.*, **60**: 353-362.
- Sastry GA. 1989. Veterinary Clinical Pathology (3rd edition). *C.B.S. Publications*: 1-25.
- Silvestre, A., Chartier, C., Sauve, C. and Cabaret, J. 2000. Relationship between helminth species diversity, intensity of infection and breeding management in dairy goats. *Vet. Parasitol.*, **94**(1-2): 91-105.
- Spence, S.A., Fraser, G.C. and Chang, S. 1996. Responses in milk production to the control of gastrointestinal nematode and paramphistome parasites in dairy cattle. *Aust. Vet. J.*, **74**(6): 456-459.
- Thanasuwan, S., Piratae, S. and Tankrathok, A. 2021. Prevalence of gastrointestinal parasites in cattle in Kalasin Province, Thailand. *Vet. World.*, **14**(8): 2091.
- Thapa Shrestha, U., Adhikari, N., Kafle, S., Shrestha, N., Banjara, M.R., Steneroden, K., Bowen, R., Rijal, K.R., Adhikari, B. and Ghimire, P. 2020. Effect of deworming on milk production in dairy cattle and buffaloes infected with gastrointestinal parasites in the Kavrepalanchowk district of central Nepal. *Vet. Rec. Open.*, **7**(1): 380.
- Wangchuk, K., Wangdi, J. and Mindu, M. 2018. Comparison and reliability of techniques to estimate live cattle body weight. *J. Appl. Anim. Res.*, **46**(1): 349-352.
- Zafar, A., Attia, Z., Tesfaye, M., Walelign, S., Wordofa, M., Abera, D., Desta, K., Tsegaye, A., Ay, A. and Taye, B. 2022. Machine learning-based risk factor analysis and prevalence prediction of intestinal parasitic infections using epidemiological survey data. *Negl. Trop. Dis.*, **16**(6): 0010517.