The Pharma Innovation Journal 2023; SP-12(10): 914-919

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(10): 914-919

www.thepharmajournal.com
Received: 08-07-2023
Accepted: 19-08-2023

Vidhya M
Professor, Department of Homeopathic Pharmacy, Venkateswara Homeopathic Medical College & Hospital Chennai, Tamil Nadu, India

K Krishnakumar
Director, Advanced Institute for Integrated Research on Livestock and Animal Sciences (AIIRLIVAS), AIIRLIVAS Cell, Nandanam, Chennai, Tamil Nadu, India

B Sai Shankar
Technician, Department of Veterinary Gynaecology and Obstetrics, Madras Veterinary College, Chennai, Tamil Nadu, India

Corresponding Author:
K Krishnakumar
Director, Advanced Institute for Integrated Research on Livestock and Animal Sciences (AIIRLIVAS), AIIRLIVAS Cell, Nandanam, Chennai, Tamil Nadu, India

Effect of *Ricinus communis* 3x and *Urtica urens* 3x in ameliorating Lactogenesis in Jersey crossbred cows

Vidhya M, K Krishnakumar and B Sai Shankar

Abstract
To elucidate the lactogenic influence of *Ricinus communis* and *Urtica urens* as natural Galactogogues, eighteen apparently healthy, pluriparous, Jersey crossbred cows with 3-5 months post-partum period maintained under uniform managerial conditions at Post Graduate Research Institute in Animal Sciences (PGRIAS), Kattupakkam, Tamil Nadu Veterinary and Animal Sciences University were utilized for this study. Group I cows served as Control, Group II and III cows were administered with 5ml of *Ricinus communis* 3X and 5ml of *Urtica urens* 3X, P/O per day for 10 days, respectively. The feeding, watering habits, physical, behavioral changes, mean rectal temperature, pulse rate, respiratory rate, status of conjunctival mucus membrane and vaginal mucus membrane were not significantly different ($p>0.05$) in all the groups. Higher milk yield was recorded between days 2 and 20 in group II and III cows. Significantly higher percentage of fat, solid not fat and total solid in milk were observed in group II and III cows than group I cows. It is inferred that *Ricinus communis* (3X) and *Urtica urens* 3X administration results in higher milk yield and better milk composition which are essential to improve the economic status of the agrarian community. Future studies are necessary to determine the pharmacodynamic and pharmacokinetic actions of the drug.

Keywords: Homeopathy, galactogogue crossbred cows, *Ricinus communis*, *Urtica urens*

1. Introduction
Lactation failure, known as agalactia or hypogalactia in cows are treated with certain natural or synthetic substances called galactogogues to increase milk production and quality. Of these galactogogues, natural galactogogues of herbal origin are safer and effective (Neela, 2016; Krishna and Swarup, 2005) [26, 13]. The extracts of *Ricinus communis* and *Urtica urens* have been used extensively in several systems of medicine as a potent lactogogue (Taheri *et al.*, 2022; Nayak *et al*. 2020; Rana *et al*. 2012; Nadkarni, 1954) [38, 24, 29, 20]. The present study was carried out to determine the influence of *Ricinus communis* and *Urtica urens* formulations in lactogenesis in Jersey crossbred cows.

2. Materials and Methods
The study was carried out at Post Graduate Research Institute in Animal Sciences (PGRIAS), Kattupakkam, Tamil Nadu Veterinary and Animal Sciences University in Eighteen apparently healthy, pluriparous, Jersey crossbred cows with 3-5 months post-partum period maintained under uniform managerial conditions. The selected crossbred cows were randomly allotted into three groups of six animals each as Group I (Control), Group II (treated with 5ml of *Ricinus communis* 3X per day orally for 10 days) and Group III (5ml of *Urtica urens* 3X per day orally for 10 days).
The mother tincture of *Ricinus communis 3X* (Figure 1a) and *Urtica urens 3X* (Figure 1b) were prepared according to the method described by Boericke (2007) [5]. The *Ricinus communis* mother tincture was prepared by dissolving 100 g of uncoarse powder in sufficient quantity of strong alcohol to make one thousand milliliters. Similarly, the *Urtica urens* mother tincture prepared by mixing 100 g of *Urtica urens* powder, 500 ml of purified water and 537 ml of strong alcohol to make up to one thousand milli liters. The appropriate potency is achieved by diluting with dispensing alcohol.

(a) *Ricinus communis*

(b) *Urtica urens*

Fig 1: *Ricinus communis* L. (Khan Marwat *et al.*, 2017) [12] and *Utrica urens* (Najem *et al.*, 2019) [23]

The crossbred cows with milk yield up to 5 L were fed with green fodder (25 kg), roughage (5 kg) and concentrate mixture (2 kg) per day, and those cows whose milk yield was more than 5 L were provided additional ½ kg of concentrate mixture in every 1 kg of milk yielding. The feeding, watering habits, physical and behavioural changes were continuously recorded from day 0 to 20 during the period of study. The estrus behaviours were studied according to Rao and Rao (1981) [30] and Krishnakumar (2001) [14] with slight modifications. The vital signs, rectal temperature, pulse rate and respiratory rate were recorded continuously from days 0 to 20 from the initiation of treatment by standard procedure. Following drug administration, milking of the control and treated cows was done twice a day, one at 3 am and at 3 pm and the quantity of milk yield was recorded. The milk fat percentage was estimated by Gerber method (Richardson, 1985; Ravi Teja, 2015) [32, 31], Total Solid (TS) percentage determined as per the method of Richardson (1985) [32] and the Solid Not Fat (SNF) was calculated as follows: SNF = TS – Fat percentage (Richardson, 1985) [32].

Statistical analysis was done as per the method described by Snedecor and Cochran (1989) [34] and Richardson (1985) [32].

3. Results and Discussion

3.1 Feeding, watering habits, physical and behavioral changes

There was no significant difference (P>0.05) in the feeding, watering habits, physical and behavioural changes in crossbred cows following drug administration in all the groups with the exception of one cow (10 percent) in groups I, II and III at peri treatment period which showed reduced feed and water intake. This is in accordance to common estrus signs as recorded by Rao and Rao (1981) [30].

3.2 Rectal temperature

There was no significant difference (P>0.05) in mean rectal temperature among crossbred cows in all the groups (Figure 2). Although the recorded rectal temperature was consistent with earlier studies (Vale, 2007; Naik, 2013) [42, 21], group II and III cows had a slightly elevated temperature following treatment (>39 °C), which is explained by higher metabolic rate during periods of lactation (Du Preez, 2000; Kadzere *et al.* 2002) [7, 9].

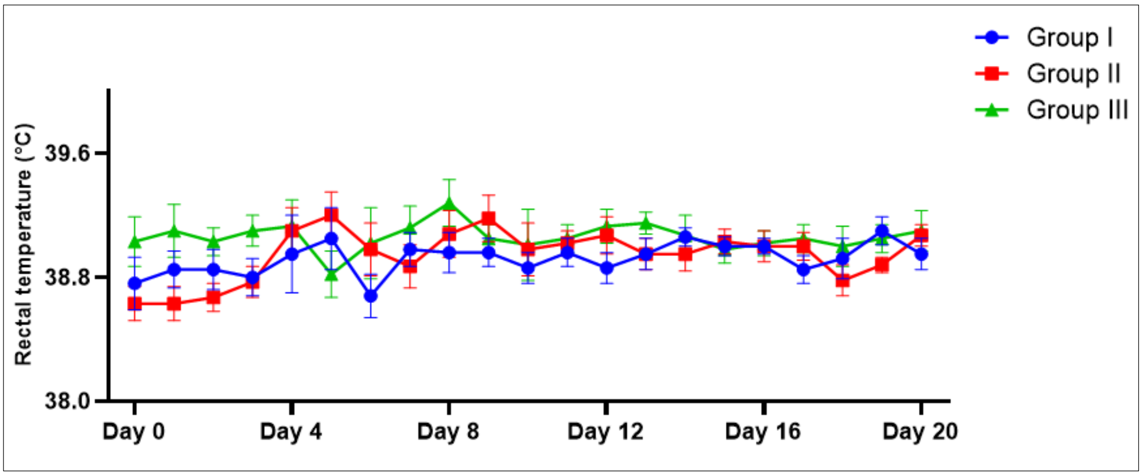


Fig 2: Mean (± SE) rectal temperature (°C) with different treatment regimens in crossbred cows

3.3 Pulse rate

The pulse rate recorded 67.67 to 70.17 per min, 76.33 to 79.67 per min and 79.50 to 81.17 per min in groups I, II and III cows, respectively between days 0 to 20 (Figure 3). This is consistent with the observed range of 70 to 77 per min in crossbred cows as reported by Mahendra Singh (2008) [15], but contrasts with the results obtained by Naik (2013) [21], Singh (2005) [33] and Chakravathi *et al.* (2004) [6], who recorded the range as between 59.79 to 63.56 per min in crossbred cows. Changes in season, breed, type of drug administered *etc.* could have caused the differences in the results (Chakravathi *et al.* 2004 and Yadav *et al.*1991) [6, 45].

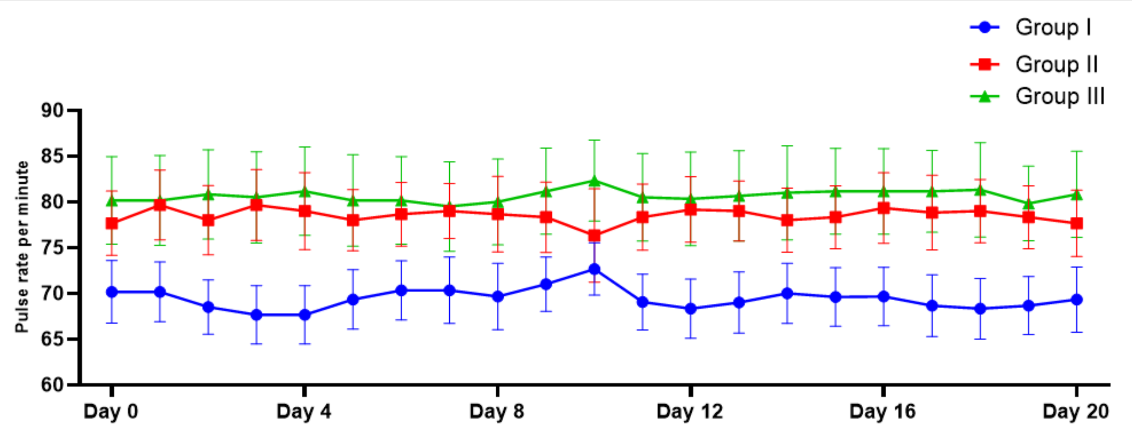


Fig 3: Mean (±SE) Pulse rate per min with different treatment regimens in crossbred cows

3.4 Respiratory rate

The respiratory rate in the present study was recorded as 31.20 to 32.40 per min, 31.10 to 33.80 per min and 38.42 to 39.01 per min in groups I, II and III cows, respectively. Although these values are consistent with Vale (2007) [42] and Sunil Kumar (2011) [37], they are in contrast with values recorded in Punganur cattle and Ongle bulls (22.52 to 27.98 per min) by Chakravathi *et al.* (2004) [6] and Naik *et al.* (2013) [21] who suggested the variations as a result of changes in season, breed, lactation and drug administration mediated stress.

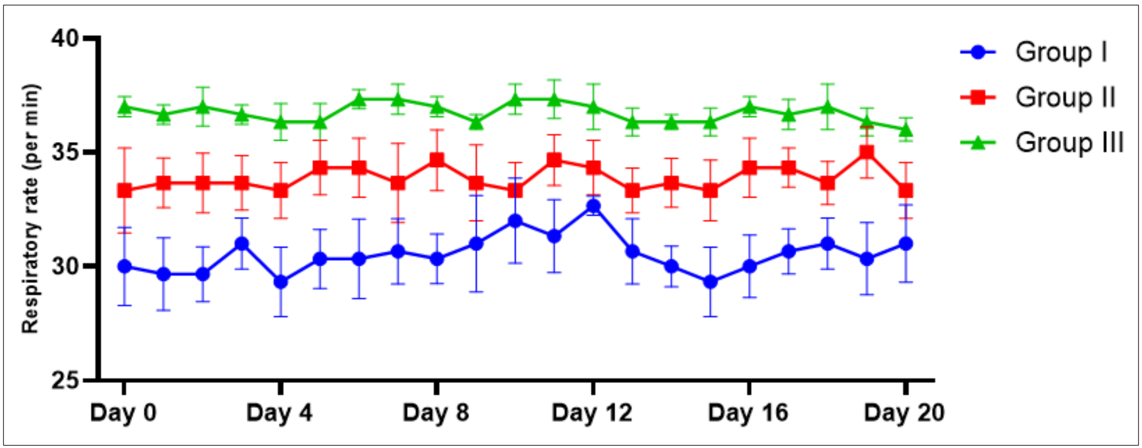


Fig 4: Mean (±SE) Respiratory rate per min with different treatment regimens in crossbred cows

3.5 Conjunctival mucus membrane

There was no significant difference (P>0.05) and 100 percent pink and moist conjunctival mucus membrane at pre, peri and post treatment period was observed in all the groups. These results suggest the normal appearance of conjunctival mucus membrane and the lack of any side effects as a result of the administration of galactogogues (Stockmen, 1993) [36].

3.6 Vaginal mucus membrane

The cows in all the groups (100 percent) were observed to have pink and moist vaginal mucus membrane in pre-treatment period. Although, 10 percent cows in groups I and II cows had congested mucus membrane, this might be due to elevated levels of circulating steroid hormones (Neble and Jobst, 1998) [25].

3.7 Milk yield

Although, there was no significant difference (P>0.05) in the milk yield on days 0 and 1, the milk yield was found to be higher between days 2 and 20 in group II and III crossbred cows (Figure 5 and 6). These results are consistent with the results reported by Bhatt *et al.* (2009) [4] who had reported improved milk production in cows following supplementation with Ruchamax.

The activity of the galactogogues *Ricinus communis* 3X and *Urtica urens* 3X by increasing prolactin secretion by stimulation of dopamine receptors through the hypothalamus and pituitary glands could have led to an increase in milk production in group II and III crossbred cows than in group I crossbred cows (Baig and Bhawat, 2009) [2]. Further studies to evaluate the pharmacokinetics is necessary to fully understand the mechanism of action of the drugs.

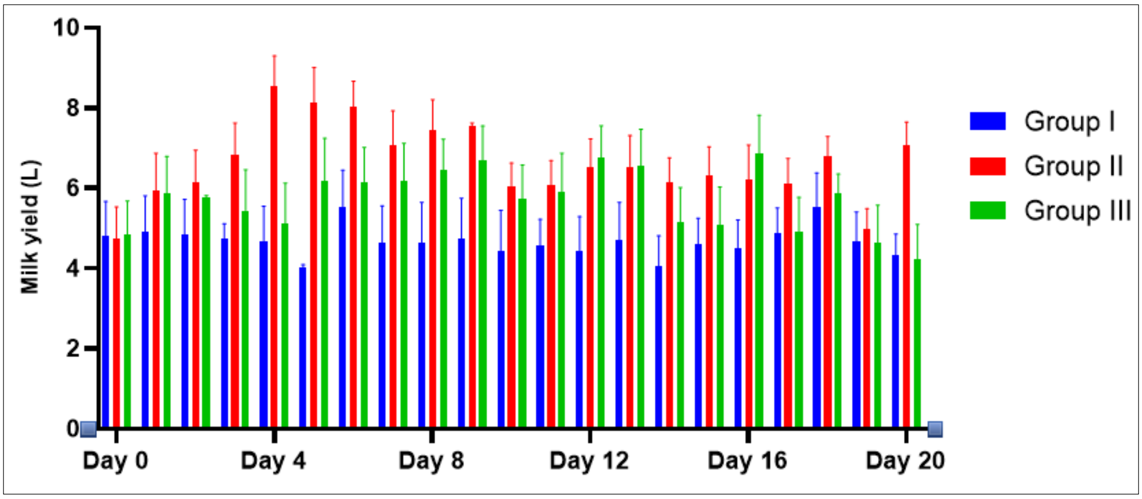


Fig 5: Mean ± (SE) milk yield with different treatment regimens in crossbred cows

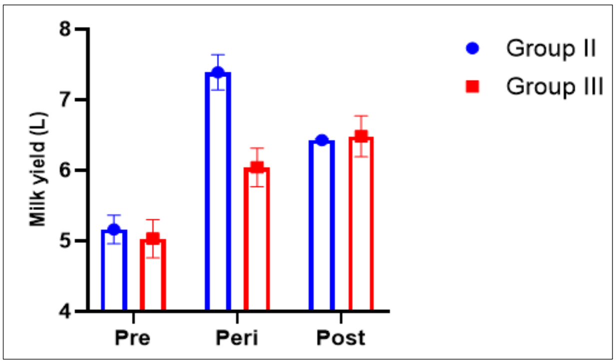
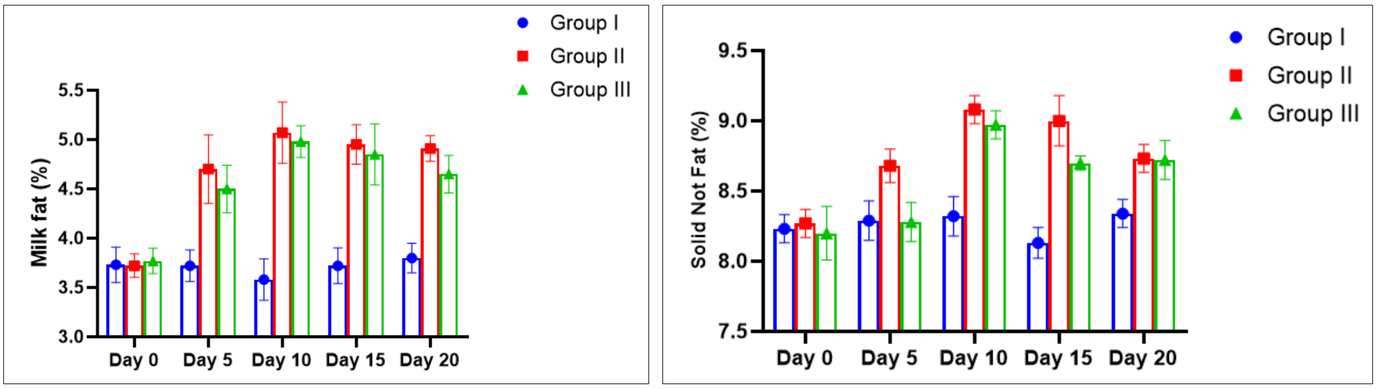


Fig 6: Milk yield at pre, peri and post treatment phases with different treatment regimens in crossbred cows

3.8 Fat concentration

There was a significantly higher (p<0.01) fat percentage in group II and III crossbred cows than in group I crossbred cows on days 15 and 20. The fat percentage in milk were in the ranges of 3.58 ± 0.21 to 3.72 ± 0.18 percent, 4.70 ± 0.35 to 5.07 ± 0.31 percent and 3.77 ± 0.13 to 4.98 ± 0.16 percent in groups I, II and III crossbred cows, respectively (Figure 7a). The results were in accordance with earlier studies (Ramesh *et al.*, 2000; Khan *et al.*, 2007; Mansson and Fonden, 2003; Naikare *et al.*, 1992; Malcolm and Paul, 1979) [28, 11, 17, 22, 16]. The administration of the *Ricinus communis* and *Urtica urens* 3X led to an increase in fat percentage and were found to be significantly higher (p<0.01) in group II and III crossbred cows than in group I crossbred cows during pre, peri and post treatment periods, which might be due to the involvement of the galactogogues in lipid metabolism (Moran *et al.*, 1994) [19] and ruminal activity in the cows (Bharati and Kumar, 2019) [3], although the exact mechanism by which this is being effected is to be evaluated by further studies.



(a) (b)

Fig 7: Mean (± SE) Milk fat percentage and Solid Not Fat (SNF) with different treatment regimens in crossbred cows

3.9 Solid Not Fat

The Solid Not Fat (SNF) content was found to be significantly higher (p<0.01) in group II and III crossbred cows than group I crossbred cows on days 0 and 20 (Figure 7b). The SNF ranged from 8.23 to 8.34 percent, 8.27 to 8.91 percent and 8.20 to 8.97 percent in groups I, II and III crossbred cows, respectively. During the pre, peri and post treatment periods, the mean SNF varied as 8.27±0.10 percent, 8.94±0.07 percent and 8.87±0.10 percent in group II crossbred cows, respectively. Similarly, the mean SNF during pre, peri and post treatment periods varied as 8.20±0.19 percent, 8.70±0.11 percent and 8.71±0.07 percent in group III crossbred cows, respectively. These results were found to be in accordance with earlier studies (Venkatachalapathy and Iype, 1998; Puranik and Nagbhushana, 2000; Teshome Gemechu *et al.*, 2015 and Sourabh *et al.*, 2017) [43, 27, 41, 35], but varied with results from other studies (Teklemichael, 2012) [40] where the SNF ranged from 8.29 to 13.29 percent in crossbred cows which might be due to factors such as seasonal changes, type of breed or the administration of galactogogue drugs.

3.10 Total Solid

There was a significant (p<0.01) increase in total solid percentage in group II and III cows than group I cows. The mean Total Solid (TS) concentration were in the ranges of 12.01 to 12.64 percent, 12.03 to 14.05 percent and 12.01 to 13.94 percent in groups I, II and III crossbred cows, respectively (Figure 8). The results were found to be in accordance with earlier studies (Islam, 2001; Mirzadeh, 2010; Teshome Gemechu *et al.*, 2015; Sourabh *et al*., 2017) [8, 18, 41, 35], but varied from the results recorded by Kaushik and Tandon (1979) [10], Babu Rao and Jaya Rama Krishna (1983) [1] who have reported average TS range from 13.40 ± 0.02 percent in Punganur cows. The variations could be attributed to the changes in milk collection times, breed, lactation stage, season and the nature of galactogogues drugs. The presence of essential amino acids, vitamins and minerals such as calcium, iron in the galactogogues might have led to an increased TS content in the present study (Weed, 1986) [44].

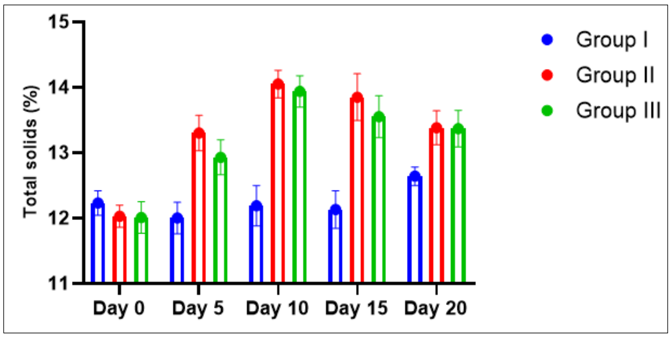


Fig 8: Mean (± SE) Total Solid (TS) percentage with different treatment regimens in crossbred cows

4. Conclusions

The milk production, milk fat percentage, total solids and solid not fat were found to be improved with the administration of *Ricinus communis* and *Urtica urens* 3X. It is concluded that the galactogogues could be used to improve milk production and the dairy economic output of the livestock holders. Future studies to characterize the pharmacokinetics of the drug is essential.

5. Acknowledgments

The authors are thankful to the Tamil Nadu Veterinary and Animal Sciences University, Chennai and Vinayaka Mission's Research Foundation, Salem for the support rendered to carry out this study.

6. References

1. Babu Rao T, Jaya Ramakrishna V. Milk constituents of three genetic groups of cows. Indian Journal of Dairy Sciences. 1983;36:286-289.
2. Baig MI, Bhagwat VG. Study of the efficacy of Galactin Vet Bolus on milk yield in dairy cows. Veterinary world. 2009;2(4):140.
3. Bharati J, Kumar S. Shatavari (*Asparagus racemosus*). Phytobiotics and Animal Production; c2019. p. 567-590.
4. Bhatt N, Singh M, Ali A. Effect of feeding herbal preparations on milk yield and rumen parameters in lactating crossbred cows. International Journal of Agriculture and Biology. 2009;11(6):721-726.
5. Boericke W, *Ricinus communis*. Pocket Manual of Homoeopathic Materia Medica. 3rd edition. Jain Publishers, New Delhi; c2007. p. 556-557.
6. Chakravarthi K, Bidarkar D, Ramesh Gupta. Drought performance of Ongole bulls under thermal stress conditions. Indian Journal of Animal Sciences. 2004;74:119-121.
7. Du Preez JH. Parameters for the determination and evaluation of heat stress in dairy cattle in South Africa. Onderstepoort Journal of Veterinary Research. 2000;67:263-271.
8. Islam KMS. Quality and amount of morning and evening milk of the Bangladesh Baghabarighat Milk Shed Area throughout the year. Asian-Australasian Journal of Animal Sciences. 2001;14(1):92-95.
9. Kadzere CT, Murphy MR, Silanikove N, Maltz E. Heat stress in lactating dairy cows: a review. Livestock production science. 2002;77(1):59-91.
10. Kaushik SN, Tandon OB. Influence of various genetic and non-genetic factors in important traits in Hariana cattle. Indian Journal of Animal Sciences. 1979;49:327-331.
11. Khan JR, Bhonsele D, Jogi S. Effect of milking interval on milk composition in Sahiwal cows, paper presented in XVI National symposium on animal resource development through physiological, nuclear genetics and biotechnological interventions. Assam Agricultural Unversity, Khanpara Guwhati; c2007. p. 89-94.
12. Khan Marwat S, Khan EA, Baloch MS, Sadiq M, Ullah I, Javaria S, *et al*. *Ricinus communis*: Ethnomedicinal uses and pharmacological activities. Pakistan journal of pharmaceutical sciences. 2017;30(5).
13. Krishna L, Swarup D. An overview of prospectus of ethno- veterinary medicine in India. Indian Journal of Animal Sciences. 2005;75:1481-1491.
14. Krishnakumar K. Effect of $PGF_{2\alpha}$, GnRG agonist, hCG and progesterone to augment fertility in repeat breeding cows. Ph.D., thesis submitted to Tamil Nadu Veterinary and Animal Sciences University, Chennai - 51 and induced oestrum in crossbred cows. Cheiron. 2001;30(5/6):174-175.
15. Mahendra Singh. Effect of modified management on milk production, composition and physiological responses in crossbred cows in eastern region. Indian Journal of Dairy Science. 2008;61:295-297.
16. Malcolm EC, Paul W. Modern milk products. 1st Edi. Magraw Hill Brok co, New York; c1979. p. 81-83.
17. Mansson LH, Fonden R. Composition of Swedish dairy milk. International Dairy Journal. 2003;13(6):409-425.
18. Mirzadeh KK. The composition of raw milk produced by some dairy farms in lordegan region. Journal of Animal and Veterinary Advances. 2010;9:1582-1583.
19. Moran JF, Becana M, Iturbe-Ormaetxe I, Frechilla S, Klucas RV, Aparicio-Tejo P. Drought induces oxidative stress in pea plants. Planta. 1994;194:346-352.
20. Nadkarni KM. Indian materia medica, 3rd edition. The Popular Book Depot, Bombay; c1954. p. 1065-1070.
21. Naik BR. Effect of seasons on physiological and hemotological values in Punganur cattle. International Journal of Pharma and Bio Sciences. 2013;4(4):40-49.
22. Naikare BD, Kale KM, Jagatap DZ. Factors affect in fat percentage and total fat in Gir crosses. Indian Journal of Animal Sciences. 1992;62:1209-1212.
23. Najem M, Daoudi A, Bouiamrine EH, Ibijbijen J, Nassiri L. Biodiversity of poisonous medicinal plants solicited in the traditional phytotherapy of the central Middle Atlas-Morocco. Ethnobotany Research and Applications.

2019;18:1-22.
24. Nayak C, Pattanaik N, Chattopadhyay A, Misra P, Bhar K, Michael J, *et al*. Individualized homeopathic medicines and *Urtica urens* mother tincture in treatment of hyperuricemia: an open, randomized, pragmatic, pilot trial. Journal of Complementary and Integrative Medicine. 2020;18(3):599-608.
25. Nebel RL, Jobst SM. Evaluation of systematic breeding programs for lactating dairy cows. A review. Journal of Dairy Science. 1998;81:1169-1174.
26. Neela R. A Review of galactogogues in Siddha system of medicine. International Journal of Research in Pharmaceutical and Nano Sciences. 2016;5:140-144.
27. Puranik DB, Nagabhushana V. Effect of breed and stage of lactation on the milk composition in HF X Deoni and Jersy X Deoni crossbred cows. Indian Journal of Animal Production and Management. 2000;16:18-19.
28. Ramesh PT, Mitra SK, Suryanaraynan. A evaluation of galactina herbal galactogogue preparation in dairy cows. The Veterinarian. 2000;24:3.
29. Rana M, Dhamija H, Prashar B, Sharma S. *Ricinus communis* L.—a review. International Journal of Pharm Tech Research. 2012; 4(4):1706-1711.
30. Rao SV, Rao AR. Oestrous behavior and ovarian activity of crossbred heifers. Indian Veterinary Journal. 1981;58:881-884.
31. Ravi Teja M. Estimation of milk, SNF gerber method, phosphatase test. Food and Nutritional Science; c2015. p. 203-205.
32. Richardson HG. Standard method for the examination of dairy products. 6th edition. American Public Health Association, Washington, DC; c1985. p. 133-150.
33. Singh BB. Effect of season on chemical composition of milk. Indian Veterinary Journal. 2005;56:768-779.
34. Snedecor GW, Cochran WG. Statistical Method. 8th Edi. Iowa State University Press, USA; c1989. p. 211-216.
35. Sourabh Y, Kumar CS, Shankar SS, Sudheer J. Correlation between milk constituents and somatic cell counts in Holstein Friesian crossbred cattle. International Journal of Agricultural Sciences. 2017;7:3840-3841.
36. Stockman A, MacLeod DI, Johnson NE. Spectral sensitivities of the human cones. Journal of the Optical Society of America. 1993;10(12):2491-2521.
37. Sunil Kumar BV. Effect of heat stress in tropical livestock and different strategies for its amelioration. Journal of Stress Physiological Biochemistry. 2011;7:45-54.
38. Taheri Y, Quispe C, Herrera-Bravo J, Sharifi-Rad J, Ezzat SM, Merghany RM, *et al*. Urtica dioica-derived phytochemicals for pharmacological and therapeutic applications. Evidence-based Complementary and Alternative Medicine; c2022.
39. Taimime AY. Milk processing and quality management society of dairy technology. United Kingdom; c2009. p. 82-84.
40. Teklemichael T. Quality and safety of raw and pasteurized cow milk produced and marketed in diary. Haryana University; c2012. p. 62-64.
41. Teshome Gemechu, Fekadu Beyene, MitikerKshetu. Physical and chemical quality of raw cow's milk produced and marketed in shashemene town. Journal of Food and Agricultutral Sciences; c2015. p. 9-10.
42. Vale WG. Effects of environment on buffalo reproduction. Journal of Animal Science. 2007;6:130-142.
43. Venkatachelapathy RT, Iype S. Fat, total solids and solids-not- fat percentage of milk in Vechru cattle. Indian Journal of Animal Sciences. 1998;68:570.
44. Weed S. Wise woman herbal for the child bearing. Ashtree; c1986. p. 28-276.
45. Yadav PL, Nautiyl PL, Saxena MM, Sanyal MK, Dubey PC. Quality characteristics of milk from HolesteinFriesion and Hariana X Exotic Cattle. Indian Veterinary Journal. 1991;68:963.