THESIS ABSTRACTS
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VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH, PARBHANI

Title	-	**Development of technology for manufacture of low-calories and low-sugar kalam**
Researcher	-	Shinde, SantoshPralhad
Research Guide	-	andhare, B.C.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	1708
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033131
Abstract	-	

The present study was carried out on "Development of technology for manufacture of low-calories and low-sugar *kalam"*. The research work was conducted in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, VNMKV, Parbhani during the year 2016-2017. *Kalam* is a popular heat desiccated traditional dairy delicacy of Maharashtra specially Parbhani district. It is prepared by blending of *khoa* and sugar followed by heat desiccation until characteristic light brown colour appears. It is a nutritive, palatable and a very good source of energy. Besides this milk based sweets, a sweet which is prepared and marketed since ancient time but could not taken proper account as research work in it by scientists. This product is manufactured since long time yet not glamorized as other *khoa*based sweet products like *Burfi, peda*etc. The main reason behind this is, these products centered into specific areas and have not proper focused by research scientists and extension workers. So, the experiment was carried out on low-calorie and low-sugar *kalam.* The process for the manufacture of low-calorie and low-sugar *kalam*was standardized. Optimization of product stages and levels of addition of maltodextrin, sugar and aspartame were used with help of sensory evaluation score. Hence, the formulation with buffalo milk with 3 per cent fat, 1per cent maltodextrin, on the basis of milk and 10 per cent sugar & 0.10 per cent aspartame on the basis of *khoa* were considered to be the most appropriate formulation for preparation of low-calories and low-sugar*kalam*. The proximate composition of developed *kalam* contained 28.78 per cent moisture, 9.98 per cent fat, 14.56 per cent protein, 10.18 per cent sugar, 2.4 per cent ash and 71.66 per centtotal solid.

The developed *kalam*samples were tasted for 100 consumers selected at randomly on the basis of age, sex and health groups. It is concluded that out of 55 (100 per cent) consumers suffering from diabetic, heart diseases and obesity, 33 (100per cent) consumers liked the developed *kalam* extremely and liked very much. The production costof developed *kalam* was worked out by taking cost of ingredients from current market rates. The total cost of production of low-calories and low-sugar*kalam* was estimated as Rs. 254.75/Kg. whereas the cost of normal *kalam* was Rs. 212.95/ Kg. The cost of production of developed *kalam* is quite higher as compared to normal *kalam*. So, it is clear from analysis that the cost of production of low-calories and low-sugar *kalam* is very quite expensive as compared to normal *kalam.* The developed *kalam*with health benefits is expected to impart all health benefits, low-calories and low- sugar effective for diabetes and peoples suffering from heart related problems and gives equivalent pleasure, taste and mouth feel as that of conventional *kalam*to health-conscious populations.

Title	-	**Studies on management practices followed for livestock fodder camps during drought in washitahasil of osmanabad district**
Researcher	-	Jadhavar, SonaliSubhash
Research Guide	-	Patil, R.A.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry
Degree	-	M.Sc
Thesis No.	-	1742
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033338
Abstract	-	

The study was conducted purposively in Washitahsil to ascertain the management practices followed for studies on management practices followed for livestock fodder camps during drought in washitahasil of osmanabad district. A field survey was conducted during Dec 2015 to june 2016 and data were collected from randomly selected 160 livestock owners through personal interview with help of pre-tested structured schedule from 4 livestock fodder camps andsimple tabular technique were used to ascertains the results of the study.The results obtained from the investigation found that a good number of livestock owners of the livestock fodder camp belonged to middle age category having medium size family with small land holding and small herd size. It was observed in camp that fodder and concentrate provided to animal in equal quantities to large animals and equal quantities to small animals. Sugrass is a source of concentrates was common in all four camps. Sugarcane and maize was provided to animal as green fodder and Jowarkadbi as dry. All of the livestock owners in camp adopted stall feeding. In four selected camps majority of the livestock owners had i. e. 84.27 per cent of adult animals and only 15.72 per cent were growing animals. Maximum livestock owners having land holding 2-4 ha. And majority i.e 46.87 per cent of the livestock owners possessed indigenous animals. The impact of drought on herd size was mostly observed in camp. At farm level majority i. e. 22.5 per cent of livestock owners having large herd size and in camp it was observed that only 11.25 per cent of livestock owners having large herd size.The overall gap of feeding practices of three categories over recommended practices had been worked out. A wide gap was noticed in feeding of concentrates i. e. -1.50 per cent gap (milking animals) at camp level. Majority i. e. 83.75 per cent of the livestock owners followed grazing + stall feeding at farm level. Majority i. e. 100.00

per cent livestock owner adopted individual feeding and in camp 100 per cent of livestock owners adopted individual feeding. It was observed that only 08.12 per cent of livestock owners provided extra salt to their milch animal. In camp during survey it was observed that in all camps there were free assess of water as per need of their animal. The findings of present study indicated that majority of livestock owners i. e. 100 per cent of livestock owners were aware about detection of animals in heat and was based on signs and symptoms. Majority of livestock owners i. e. 55.62 per cent used natural service at farm level and in camp 33.12 per cent livestock owners adopted A. I. service. The overall livestock owners in selected fodder camp did not kept breeding record. Majority i.e. 88.75 per cent of the livestock owners followed the knuckling method. 100 per cent of the livestock owners followed two times milking and 70.00 per cent of livestock owners followed stripping at the end of milking. It was observed that 70.00 per cent of the livestock owners preferred kutcha type of housing. 100 per cent of livestock owners followed vaccination against FMD and HS and 78.12 per cent of livestock owners at farm level. In camp 100 per cent of livestock owners treated sick animal from veterinary doctor.

The impact of drought was also noticed in average milk production. It was observed that 20.00 per cent of animals produce 6-8 lit. milk at farm level whereas only 9.37 per cent animals produce 6-8 lit. Milk in camp. The milk production of 88.93 per cent animals had decreased and only 11.06 per cent animals had no impact on milk production.The common constraints of feeding was observed at farm level and in camp. Majority i.e. 100 per cent of livestock owners had lack of grazing pasture land in camp. Lack of knowledge about balance feeding faced by 42.5 per cent of livestock owners at farm level and in camp, lack of knowledge about preservation of feed and fodder about 33.75 per cent livestock owners. Inadequate knowledge of A. I. services faced by 47.5 per cent livestock owners and lack of knowledge about time of mating faced by 80.00 per cent of livestock owners. The most important housing constraint were high construction cost faced by 92.5 per cent of livestock owners. Lack of knowledge about animal disease faced by 20.00 per cent of livestock owners. Majority 100 per cent of livestock owners faced the problem of proper rate of milk. Majority i. e. 88.75 per cent of livestock owners suggested to provide proper manger feeding to animal and 100 per cent of livestock owners suggested to provide supplementary feeding to animal, 80.00 per cent of livestock owners suggested to distribute good breedable bulls at camp level, 100 per cent of livestock owners opinined to provide appropriate housing for animal and 81.87 per cent of livestock owners

suggested to provide adequate floor space to animal. 100 per cent of livestock owners suggested to increasing milk collection centers.It was concluded that all livestock fodder camp provided green and dry fodder but insufficient amount of concentrate to lactating animals leads to decline in milk production in camp during drought. Hence there is need to demonstrate scientific feeding and management practices also management of fodder and water during drought which is need for exploiting optimum production and proper management of livestock during drought.

Title	-	**Studies on management practices followed by livestock fodder camps during drought in bhoomtahsil of osmanabad district**
Researcher	-	Somatkar, Vishnu Bhagwan
Research Guide	-	Chauhan, D.S.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry
Degree	-	M.Sc
Thesis No.	-	1743
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033339
Abstract	-	

The present investigation entitled "Studies on Management Practices Followed by Livestock Fodder Camps during Drought in BhoomTahsil of Osmanabad District" was undertaken to study the different package of practices followed for livestock. Five livestock fodder camp from Bhoomtahsil of Osmanabad district were selected with the objectives to study the feeding, breeding, housing and health cover practices of livestock, to record the production performance and to study the constraints faced by the livestock owner.The data was collected from the 200 respondents in four livestock fodder camp. The study revealed that 28.05 per cent of the respondents were marginal farmers, 32.00 per cent of the respondents were small farmers, 24.00 per cent of the respondents were medium farmers, 15.05 percent of the respondents were large farmers while 0.00 per cent of the respondents landlesslabourers respectively. Mejority of livestock owners reared indigenoug animal (90.00 per cent) followed by cross breed (47.00 per cent) and 20.50 per cent farmer had non-descript animal. All the farmers in fodder camp provide feed and fodder as decided by state government i.e. large animals were fed with 15 kg green fodder, 6 kg dry fodder and 0.500 kg concentrates whereas small animals were fed with 7.5 kg green fodder, 3 kg dry fodder and 0.250 kg concentrates respectively. In management practises vaccination and health checking of animal were followed 100 per cent, while cleaning and sanitation of camp and animal practiced by 92.50 per cent. Artificial insemination technique was followed by 75.00 per cent farmers, whereas 44.00 per cent of respondent followed mating of animal at right time. In production performance, the majority of cow i.e. 37.91per cent were yielding 2.1 to 4 liters milk per day whereas majority of buffalo i.e. 33.83 per cent were yielding 4.1 to 6 liters milk per day. In constraints, feeding constraints, production and marketing

constraints, technical constraints and health related constraints were faced by farmer in livestock fodder camp. Hence it may be concluded that there is need to demonstrate scientific feeding and management practices, also management of fodder and water for summer season which is need for exploiting optimum production and proper management of livestock.

Title	-	**Studies on preparation of shrikhand from soya milk blended with cow milk**
Researcher	-	More, RamprasadVashistha
Research Guide	-	Chavan, K.R.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Dairy Science
Degree	-	M.Sc
Thesis No.	-	1748
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033346
Abstract	-	

The present study was carried out on "Studies on preparation of *shrikhand* from soya milk blended with cow milk*"*. The research work was conducted in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, VNMKV, Parbhani during the year 2016-17. *Shrikhand* was prepared from soya milk by blending of cow milk at 10 per cent, 20 per cent and 30 per cent with 60 per cent sugar as per weight of *chakka*. The product obtained was subjected for chemical analysis and organoleptic evaluation by panel of judges. It was observed that the colour and appearance score for treatment T_1, T_2, T_3 and T_4 was 6.88, 7.13, 7.25 and 7.63, respectively. Flavour score was 6.25, 6.88, 7.00 and 7.38 respectively. Body and texture was 6.75, 7.25, 7.50 and 7.75, respectively. Sweetness score was 7.00, 7.13, 7.25 and 7.50, respectively. It was observed that the overall acceptability score for sensory was 6.72, 7.10, 7.25 and 7.57, respectively for T_1, T_2, T_3 and T_4. It was observed that as the level of cow increased the overall acceptability score increased.

It was observed thatOn an average the moisture content of *Shrikhand* was found to be 46.47, 45.63, 44.67 and 42.89 per cent, acidity 0.91, 1.03, 1.18 and 1.34, pH 4.49, 4.33, 4.28 and 4.25, fat 6.13, 6.40, 6.79 and 7.21 per cent, protein 6.23, 6.50, 6.83 and 7.21 per cent, ash 0.29, 0.44, 0.53 and 0.68 per cent, total sugar 4.86, 41.05, 41.20 and 42.01 per cent and total solids 53.52, 54.37, 55.33 and 57.11 per cent for treatment T_1, T_2, T_3 and T_4, respectively. It was also observed that as the blending of cow milk increased, there was increase in acidity, fat, protein, acidity, ash and total solids and decrease in pH and moisture content of developed product. The fresh product was subjected to microbial analysis with respect to *lactobacilus* count, yeast and mould count and coliform count. The *lactobacilus* count of fresh samples were ranged in

between 2.08 to 2.46 cfu x 10^6 / gm for treatment T_1 to T_4 , the yeast and mould count of *shrikhand*ranged between 0.00 to 0.25 cfu/gm for treatment T_1 to T_4 and coliform count was found to be absent in all *shrikhand* excepttreatments T_1.

Sensory parameters of *shrikhand* i.e. colour and appearance, flavour, sweetness, body and texture and overall acceptability were decreased progressively in all treatments within 12 days. All treatments were remained acceptable for 12 days. There were no noticeable differences between treatments for all sensory properties. Hence it indicates from that there was no effect of blending of soya milk in cow milk up to 30 per cent on storage life of *shrikhand* at refrigerator temperature in respect to sensory properties. But compositional parameters may be affected

The cost of control *shrikhand* was found to be highest for T_3Rs. 115.5 per kg. The lowest cost was recorded for treatment T_1 as Rs. 109.4 per kg. The cost for treatment T_2 and T_4 were Rs.114.9 and Rs.113.4 per kg, respectively. It can be concluded that soya milk can be well utilized for preparation of nutritious, palatable and low cost *shrikhand* by blending 30 per cent cow milk with 70 per cent soya milk on weight basis.

Title	-	**Preparation of *paneer* from toned milk using sago powder**
Researcher	-	Maske, TusharAshokrao
Research Guide	-	andhare, B.C.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Dairy Science
Degree	-	M.Sc
Thesis No.	-	1749
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033366
Abstract	-	

The present study was carried out on "Preparation of *paneer* from toned milk using sago powder*"*. The research work was conducted in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, V.N.M.K.V., Parbhani during the year 2016-17. *Paneer*was prepared from different levels of toned milk and sago powder, i.e. (T_1-100 Parts of toned milk), (T_2-97.50 Parts of toned milk + 2.50 parts of sago powder.) (T_3- 95.00 Parts of toned milk + 5.0 parts of sago powder) And (T_4- 92.50 Parts of toned milk + 7.50 parts of sago powder) added on the weight basis of milk. The temperature level for addition of sago powder was optimized by conducting sensory test for three levels of temperature i.e. at room temperature, at 72^0C and 87^0C on the basis of sensory test recorded for test/ mouth feel only on 9 point hedonic scale by semi expert panel of judges. In all treatments, the maximum score for test/ mouth feel was recorded at 72^0C temperature level which is optimized for preparation of sago *paneer*.

It was observed that the overall acceptability score for sensory was 8.63, 7.88, 7.13 and 6.38 respectively for T_1, T_2, T_3 and T_4. As the level of sago powder increased, the overall acceptability score was decreased. The highest score for overall acceptability was found 8.63 (like very much) in T_1 and lowest score was found 6.38 (like slightly) in T_4 treatment. On an average, sago powder used *paneer*of treatment T_1, T_2, T_3 and T_4 contained moisture 60.90, 62.03, 62.61 and 62.85 per cent; Fat 15.45, 14.83, 13.43 and 13.33 per cent; Protein 18.64, 17.34, 16.90 and 16.63 per cent; Ash 2.06, 2.13, 2.19 and 2.23 per cent; Total solids 39.31, 37.97, 37.39 and 37.15 per cent; Carbohydrate 2.89, 4.56, 5.13 and 5.73 respectively. **Textural qualities of sago *paneer,* for T_2combination of sago *paneer* @ 2.5 per cent, the values** for hardness 6.72 kg,

cohesiveness 0.18, elasticity 1.24 cm, gumminess 1.20 kg/N and chewiness 1.67 @ kg-cm were established.

The fresh product was subjected to microbial analysis with respect to yeast and mould count and coli form count. The yeast and mould count of sago*paneer*ranged between 1.01 to 1.11 c.f.u. per gm for treatment T_1 to T_4 and coli form count was found to be absent in all treatments ofsago *paneer*. During storage period of sago *paneer*, observed that the sample stored under room temperature i.e. at 37^0C has a poor shelf storage life as compared to refrigerated temperature i.e.5^0C. The samples stored in room temperature have storage life two days whereas the storage life was 6 days in case of refrigerated temperature. It can also be concluded from investigation that the samples stored under 5^0C were found more successful in preserving the all physico-chemical attributes, textural properties and microbial load of sago *paneer*.

Title	-	**Studies on management practices followed for livestock fodder camp during drought in osmanabad tahshil of osmanabad district**
Researcher	-	Bhande, YogitaBhagwanrao
Research Guide	-	Patil, R.A.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry
Degree	-	M.Sc
Thesis No.	-	1752
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033457
Abstract	-	

The study was conducted purposively in Osmanabadtahsil to ascertain the management practices followed for livestock fodder camp during drought. A field survey was conducted during March 2016 to May 2016 and data were collected from selected 160 livestock owners through personal interview with help of pre-tested structured schedule from 4 livestock fodder camps andsimple tabular technique were used to ascertains the results of the study. The Socio-economic status of livestock fodder camp regarding date of establishment, number of animals maintained, funds provided by government per animal and available feed resource etc. were recorded. The regarding socio-economic profile of these selected livestock owners was collected the data.A good numbers respondents of this area belonged to middle age category having medium size family with medium land holding and small herd size and annual income.

The green feed provided by camp organizer to livestock owner was 15 Kg for large animal and 7.5 Kg for small animal. Whereas, dry fodder provided per animal per day was 6 Kg for large animal and 3 Kg for small animal. As far as the concentrate feed was concerned 0.50 Kg and 0.25 Kg per day per animal for large animal and small animal, respectively. All camps provided the same dry fodder, green fodder and concentrates with chaffing.Availability of veterinary doctor and AI facility in all camps. All camps provided the shed net or partial thatched roof to protect their animal. Vaccination against FMD and HS provided the all camps.

Comparison of management practices followed in camp during drought and at farm before drought. 90.63 per cent of the farmers both stall feeding and grazing but 100 per cent of farmers stall feeding to their animal. 70.62 and 100 per cent of the farmers as such and chaffed

feed offered to their animal, respectively. Frequency of watering 2 times and free assess 41.87 and 100 percent of farmers adopted. 100 and 25.62 per cent of livestock owners identify animals in heat by using method symptoms at farm and in camp (availed practice), respectively. 41.25 and 25.26 per cent of farmers follow AI method of breeding at farm level and in camp, respectively. 60.00 and 100 per cent of farmers provided *kutcha*type of housing at farm and in camp, respectively. 100 and 91.87 per cent of the farmers provided vaccination in camp and farm level.88.12 per cent of farmers applied knuckling method of milking in camp as well as at farm. 88.31 and 11.68 per cent of animals decrease and maintain the milk production, respectively.

Constraints faced by camp organizer less supply of fund, long distant of transportation of feed and high cost of feed. 90.00 and 100 per cent of the farmers faced by high cost of feed at farm level and in camp.41.25 per cent of the farmers faced by the unavailability of AI services. 38.75 and 14.37 per cent of farmers faced by the lack of adequate space at farm and in camp, respectively. 43.75 per cent of the farmers faced by the constraint high cost of animal disease treatment and in camp not faced this constraint to farmers. Non remunerative price for milk 88.13 per cent of farmers faced by this constraint in camp and at farm. Livestock owners suggested they provide the sufficient green fodder and concentrates. Farmers suggested the overcrowding in shed should be avoided.

It can be concluded that in all livestock fodder camps provided optimum amount of green and dry fodder but wide gap in concentrates feeding. Majority of lactating animals declined milk production in livestock fodder camp during drought. Hence, there is need to demonstrate scientific feeding management practices also management of fodder and water during drought which is need for exploiting optimum production and proper management of livestock during drought.

Title	-	**Studies on management practices followed for livestock fodder camps during drought in parandatahshil of osmanabad district**
Researcher	-	Tate, MirabaiShrirang
Research Guide	-	Patil, R.A.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry
Degree	-	M.Sc
Thesis No.	-	1753
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033459
Abstract	-	

The study was conducted purposively in Parandatahsil to ascertain the management practices followed for livestock fodder camp during drought.A field survey was conducted during March 2016 to May 2016 and data were collected from selected 160 livestock owners through personal interview with help of pre-tested structured schedule from four livestock fodder camps andsimple tabular technique were used to ascertains the results of the study.The Socio-economic status of livestock fodder camp regarding livestock funds provided by Government was ₹ 70/ animal/day for large animal whereas, ₹ 35/animal/day for small animal in all camps. As far as the feed resources is concerned in green fodder all camps used sugarcane and maize as a source of green fodder whereas, in dry fodder Jawar*kadbi*was common in all four camps and other than Jawar*kadbi*and*bhussa* was utilized by in camp VI only. Sugrass as a source of concentrates was common in all four livestock fodder camps. The regarding socio-economic profile of these selected livestock owners the maximum farmers 36.87 per cent having landholding 1 to 2 ha. Highest per cent of livestock owners i.e. 53.12 per cent belongs to middle age group, 33.12 per cent of farmers educated up to primary school level58.12 per cent of farmers belongs to small family size (1 to 5 members) and 71.87 per cent of the farmers had nuclear type family. At farm level i.e. before drought 54.37 per cent of the livestock belongs to low annual income. Majority of farmers i.e. 53.12 per cent had small herd size at farm level whereas, in camp 72.50 per cent had small herd size. Herd size reduced up to 54.55 per cent during drought by the farmers owning large herd. A wide gap was also noticed in feeding of concentrates 85.71 per cent.No any selected livestock fodder camp followed the use of unconventional feed and enrichment of poor quality roughages with urea and did not supply mineral blocks to animals. Regarding housing

practices in all selected camp there were provision of shelter to protect the animals from extreme weather. Green shed nets were provided for shelter in all four camp but shed nets + partial thatching was provided in only first camp.All farmers in livestock fodder camp used chaffed green/ dry fodder for their animals while at farm level majority i.e. 93.12 per cent of farmers fed green and dry fodder after chaffing. There is no restriction on the frequency of watering in camp, that there is free assess of water for animals. Artificial insemination was followed by 48.12 per cent of farmers at farm level before drought, while out of that 26.87 per cent of livestock owners availed this practice during drought in camp. During drought in camps only 18.75 percent of farmers provided wooden assisted type of manger to their animals, while at farm level 56.25 per cent of livestock owners had kutcha type of manger. 100 percent of all the livestock owners practiced regular vaccination against contagious diseases in livestock fodder camp whereas, 79.37 percent of the respondents practiced regular vaccination to their animals. In fodder camps 100 per cent of livestock owners milked their animals at same place. About 90.62 per cent of farmers at farm level milked their animals at same place.Only 06.74 per cent of lactating animals maintained milk production during drought and maximum i.e. 93.25 per cent of animals declined milk production during drought. None of the lactating animals had increased milk production during drought in camp. It was concluded that all livestock fodder camp provided green and dry fodder but insufficient amount of concentrate to lactating animals leads to decline in milk production in camp during drought. Hence there is need to demonstrate scientific feeding and management practices and also provision of concentrates along with mineral blocks during drought which is need for exploiting optimum production and proper management of livestock during drought.

Title	-	**Studies on preparation of shrikhand by using black carrot juice**
Researcher	-	Ghube, Pravin Suresh
Research Guide	-	Londhe, G.K.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Dairy Science
Degree	-	Ph.D.
Thesis No.	-	1759
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033471

Abstract -

Shrikhand was prepared using different levels of black carrot juice to increase nutritional quality and overall acceptability. In preparation of *shrikhand* different levels of black carrot juice was 0%, 3%, 5%, 7% and 9% on the basis of *chakka* was added and result obtained that *shrikhand* prepared using 3% black carrot juice i.e., Treatment T_2 outlaid the better organoleptic properties viz, flavour, colour and appearance, body and texture, mouthfeel and overall acceptability followed by treatment T_1, T_3, T_4 and T_5. The physico- chemical analysis resultsshows that tritratable acidity, protein, moisture, and viscosity was increases with increases levels of black carrot juice while fat, lactose, sucrose, solid not fat, total solid and pH decreases with increases levels of black carrot juice. Further analysis of shelf life *shrikhand* stored at 7 ^{0}C and concluded that treatment T_2 was acceptable up to 28 days while T_1 and T_3 were acceptable up to 21 days and T_5 was 14 days. The physico-chemical analysis of *shrikhand* during storage resultsshows that tritratable acidity, fat, protein, lactose, sucrose, total solid and pH was decreased and tritratable acidity, moisture, antioxidant activity and colour stability was increased. Similarly microbiology in storages total plate count and yeast and mould count was increased but treatment T_5 TPC and YMC lower growth as compare to treatment T_1. Couliform count was absent in *shrikhand* during overall storage period. Moreover, due to addition of black carrot juice at higher level can reduce its cost of production. Such a value added, novel product having superior quality but lower price can fetch more consumers and good price in the market benefiting the producer. As per FSSAI guidelines,all the nutrients were in prescribed range. There was significant difference between and within the treatments.

Title	-	**Preparation of shrikhand from soy milk blended with buffalo milk**
Researcher	-	Dalave, SateshAnkush
Research Guide	-	Chavan, K.R.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Dairy Science
Degree	-	M.Sc
Thesis No.	-	1767
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033565
Abstract	-	

Shrikhand was prepared from soy milk blended with buffalo milk at 10 per cent, 20 per cent and 30 per cent with 60 per cent sugar as per weight of *chakka* and cardamom 1 gm/kgweight of *chakka* was added as flavouring agent. Control *shrikhand* was prepared using soy milk only. The product obtained was subjected for organoleptic evaluation by panel of judges and physico-chemical analysis.

It was observed that the colour and appearance score for treatment T_1, T_2, T_3 and T_4 was 6.75, 7.13, 7.38 and 7.75, respectively. Flavour score was 6.38, 6.75, 7.00 and 7.50 respectively. Body and texture was 6.25, 6.75, 7.25 and 7.88, respectively. Sweetness score was 6.75, 7.00, 7.38 and 7.88, respectively. It was observed that the overall acceptability score for sensory was 6.53, 6.91, 7.25 and 7.75, respectively for T_1, T_2, T_3 and T_4. It was clear that as the level of buffalo increased in the blend the overall acceptability increased.

It was observed thaton an average the acidity content of *shrikhand* was found to be 0.91, 1.03, 1.18 and 1.33, pH 4.49, 4.32, 4.28 and 4.26 per cent, fat 6.26, 6.62, 6.89 and 7.37 per cent, protein 6.28, 6.77, 6.95 and 7.44 per cent, total sugar 41.09, 41.24, 41.77 and 42.06 per cent, moisture 45.89, 44.81, 43.79 and 42.44 per cent, total solids 54.11, 55.19, 56.21 and 57.56 per cent and ash 0.49, 0.50, 0.60 and 0.69 per cent for treatment T_1, T_2, T_3 and T_4, respectively. It was also indicate that as the blending of buffalo milk increased, there was decrease in pH and moisture content and increase in acidity, fat, protein, total sugar, total solids and ash content of *shrikhand*.

The fresh product was subjected to microbial analysis with respect to *lactobacilus* count, coliform count and yeast and mould count. The *lactobacilus*count of fresh samples were in

between 2.13 to 2.60 cfu x 10^6 per gm for treatment T_1 to T_4. The coliform count of developed product was in between 0.75 to 0.00 cfu/gm. the yeast and mould count of *shrikhand*ranged between 1.25 to 0.00 cfu/gm for treatment T_1 to T_4.

Sensory parameters of *shrikhand* i.e. colour and appearance, flavour, sweetness, body and texture and overall acceptability were decreased progressively in all treatments within 12 days. All treatments were remained acceptable for 12 days. There were no noticeable differences between treatments for all sensory properties. Hence it indicates from that there was no effect of blending of soy milk in buffalo milk up to 30 per cent on storage life of *shrikhand* at refrigerator temperature in respect to sensory properties. But compositional parameters may be affected.

The cost of control *shrikhand* was found to be highest for T_3Rs. 114.38 per kg. The lowest cost was recorded for treatment T_1 as Rs. 109.4 per kg. The cost for treatment T_2 and T_4 were Rs.113.37 and Rs.111.45 per kg, respectively, it can be concluded that the soy milk can be well utilized for preparation of nutritious, palatable and low cost *shrikhand* by blending 30 per cent buffalo milk with 70 per cent soy milk on weight basis.

Title	-	**Studies on management practices followed for livestock fodder camps during drought in ashtitahsil of beed district**
Researcher	-	Kadam, JaisreeVenkatrao
Research Guide	-	Thombre, B.M.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17147
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810033997
Abstract	-	

The present investigation entitled "Studies on Management Practices Followed for Livestock Fodder Camps during Drought in AshtiTahsil of Beed District" was undertaken to study the different package of practices followed for livestock. Four livestock fodder camp from Ashtitahsil of Beed district were selected with the objectives to study the feeding, breeding, housing and health cover practices of livestock, to record the production performance and to study the constraints faced by the livestock owner.The data was collected from the 400 respondents in four livestock fodder camp. The study revealed that 50.50 per cent of the respondents were marginal farmers, 28.00 per cent of the respondents were small farmers, 21.00 per cent of the respondents were medium farmers, 00.50 percent of the respondents were large farmers while 00.00 per cent of the respondents are landlesslabours respectively. Majority of livestock owners reared indigenous animal (93.25 per cent) followed by crossbred (42.00 per cent) and non-descript animal (03.25 per cent). All the farmers in fodder camp provide feed and fodder as decided by state government i.e. adult animals were fed with 15.00 kg green fodder, 6.00 kg dry fodder and 0.500 kg concentrates whereas growing animals were fed with 7.50 kg green fodder, 3.00 kg dry fodder and 0.250 kg concentrates respectively. In management practices vaccination and health checking of animal were followed 100 per cent, while cleaning and sanitation of camp and animal practiced by 98.00 per cent. Artificial insemination technique was followed by 93.50 per cent farmers, whereas 52.75 per cent of respondent followed natural mating. In production performance, the majority of cows i.e 40.50 per cent were yielding 2.1 to 4 liters milk per day whereas majority of buffalos i.e 43.65 per cent yielding between 4.1 to 6 liters milk per day. In constaints, feeding constraints, production and marketing constraints, technical

constraints and health related constraints were faced by farmer in livestock fodder camp. Hence it may be concluded that there is need to demonstrate scientific feeding and management practices, also management of fodder and water for summer season which is need for exploiting optimum production and proper management of livestock.

Title	-	**Studies on management practices followed for livestock fodder camps during drought in wadvani and dharurtahsil of beed district**
Researcher	-	Sabale, ThaksenDnyandeo
Research Guide	-	Chauhan, D.S.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17151
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034008
Abstract	-	

The present investigation entitled "Studies on Management Practices Followed for Livestock Fodder Camps during Drought in Wadvani and DharurTahsil of Beed District" was undertaken to study the different package of practices followed for livestock. Four livestock fodder camp from Wadvani and Dharurtahsil of Beed district were selected with the objectives to study the feeding, breeding, housing and health cover practices of livestock, to record the production performance and to study the constraints faced by the livestock owner.The data was collected from the 400 respondents in four livestock fodder camp. The study revealed that 25.50 per cent of the respondents were marginal farmers, 33.25 per cent of the respondents were small farmers, 38.25 per cent of the respondents were medium farmers, 3.00 percent of the respondents were large farmers while there is no respondents landlesslabourers respectively. Majority of livestock owners reared indigenous animal 92.75 per cent followed by cross breed 27.00 per cent and 4.25 per cent farmer had non-descript animal. All the farmers in fodder camp provide feed and fodder as decided by state government i.e. large animals were fed with 15 kg green fodder, 6 kg dry fodder and 0.500 gm concentrates whereas small animals were fed with 7.5 kg green fodder, 3 kg dry fodder and 0.250 gm concentrates respectively. In management practises vaccination and health checking of animal were followed 100 per cent, while cleaning and sanitation of camp and animal practiced by 97.00 per cent. Artificial insemination technique was followed by 78.25 per cent farmers, whereas 25.25 per cent of respondent followed mating of animals. In production performance, the majority of cow i.e. 35.49 per cent were yielding 2.1 to 4 liters milk per day whereas majority of buffalo i.e. 32.23 per cent were yielding 4.1 to 6 liters milk per day. In constraints, feeding constraints, production and marketing constraints, technical constraints and

health related constraints were faced by farmer in livestock fodder camp. Hence, it may be concluded that there is need to demonstrate scientific feeding and management practices, also management of fodder and water for summer season which is need for exploiting optimum production and proper management of livestock.

Title	-	**Effect of dry period on the subsequent production and reproduction performance in holdeo (holsteinfriesian x deoni) interse**
Researcher	-	Bagesar, JayashriLahanuji
Research Guide	-	Thombre, B.M.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry
Degree	-	M.Sc
Thesis No.	-	17154
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034013
Abstract	-	

The research work entitled 'Effect of Dry Period on the Subsequent Production and Reproduction Performance in Holdeo (Holstein Friesian x Deoni) Interse' was conducted for present investigation. It involves investigations of productive and reproductive characteristics viz., Lactation milk yield, Peak milk yield, Days to reach peak milk yield, Lactation period, Dry period, Service period, Gestation period and Inter calving period. The study included 25 years data (1991-2015) on lactation records of total 960 Holdeointerse cows. The overall least squares means were LMY for (1495.45 ± 123.74 kg), PMY (7.35 kg), DRPMY (35.36 ± 0.15 days), LP (275.58 ± 2.63 days), DP (124.83 ± 5.76 days), SP (126.36 ± 5.63 days) and ICP (402.85 ± 5.58 days). The LMY and DRPMY in Holdeointerse cow was not significantly affected by period of calving, season **of** calving, lactation order and dry period. However, The PMY, LP, DP, GP and ICP was significantly affected by period of calving ($P < 0.01$) in Holdeointerse cows. However, season of calving, lactation order and dry period had non-significant effect on PMY and DP. Overall least squares means of DP in Holdeointerse cows for 124.83 ± 5.76 days. The effect of period of calving on DP was significant and season of calving and lactation order had non-significant. Overall least squares means for SP in Holdeointerse cows was 126.36 ± 5.63 days. Only period of calving had non- significant effect on SP. The rest of factors viz., season of calving, lactation order and dry period had significant ($P < 0.01$) effect on SP in Holdeointerse cows. The overall least squares means for GP in Holdeointerse cows was 278.24 ± 0.19 days. The effect of period of calving and season of calving on GP was significant and lactation order and dry period had non-significant. Overall least squares means for ICP in Holdeointerse cows was 402.85 ± 5.58 days. Only dry period had non- significant effect on ICP. The rest of factors

viz., period of calving, season of calving, lactation order had significant ($P < 0.01$) effect on ICP in Holdeointerse cows. The non genetic factors especially feeding, climate change and global warming might be the main assumed factors influenced productive and reproductive characteristics in Holdeointerse cow.

Title	-	**Studies on preparation of *burfi* blended with finger millet**
Researcher	-	Kapare, PrakashBalu
Research Guide	-	Narwade, S.G.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17158
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034022

Abstract -

The present study was carried out on "Studieson preparation of *burfi*blended with finger millet*"*. The research was conducted in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, VNMKV, Parbhani during the year 2016-17. *Burfi* was prepared from buffalo milk (standardized with 6 per cent fat and 9 per cent SNF) with constant level of sugar (30 per cent by weight of *khoa*) and different levels of finger millet (3, 6, 9 and 12 per cent by weight of *khoa*). It was observed that the overall acceptability score for treatment T_0, T_1, T_2, T_3 and T_4 were 8.80, 8.42, 8.20, 7.87 and 7.47 respectively. As the level of finger millet in *burfi* increases the overall acceptability score decreases. The highest score is for control (T_0) but with in different level of finger millet 3 per cent secured maximum score with 8.43 (like very much to like extremely) and lowest score was found to be 7.47 (like moderately to like very much). On an average finger millet *burfi* of treatment T_0, T_1, T_2, T_3 and T_4 contained moisture 16.84, 16.62, 16.35, 16.09 and 15.87 per cent; fat 21.07, 20.48, 19.90, 19.31 and 18.72per cent; protein 15.00, 14.79, 14.58, 14.37 and 14.16 per cent; ash 2.43, 2.49, 2.54.2.58 and 2.63 per cent; carbohydrate 44.66, 45.65, 46.64, 47.64 and 48.62 and total solids 83.16, 83.39, 83.66, 83.91 and 84.13 per cent respectively.

Burfi sample was evaluated for textural qualities viz., Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness. Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness of the treatment (T_0) was 1.757, 1.345, -0.035, 10.722, -0.061 and -0.654 for treatment T_1 was 2.003, 1.293, -0.017, 11.026, -0.034 and -0.375 for treatment T_2 was 2.660, 1.442, -0.028, 11.109, -0.074 and -0.822 for treatment T_3 was 2.955, 1.344, -0.024,

10.521, -0.070 and -0.736 for T_4 was 3.297, 1.362, -0.055, 10.533, -0.181 and -1.906 respectively.

Title	-	**Studies on management practices followed for livestock fodder camps during drought in georaitahsil of beed district**
Researcher	-	Jadhav, Sangram
Research Guide	-	Bainwad, D.V.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17159
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034024
Abstract	-	

The present investigation entitled “Studies on Management Practices Followed for Livestock Fodder Camps during Drought in GeoraiTahsil of Beed District” was undertaken to study the different package of practices followed for livestock. Four livestock fodder camps from Georaitahsil of Beed district were selected with the objectives to study the feeding, breeding, housing and health cover practices of livestock, to record the production performance and to study the constraints faced by the livestock owner.The data was collected from the 400 respondents in four livestock fodder camp. The study revealed that 24.50 per cent of the respondents were marginal farmers, 28.75 per cent of the respondents were small farmers, 42.00 per cent of the respondents were medium farmers, 04.75 per cent of the respondents were large farmers while 00.00 per cent of the respondents landlesslabourers, respectively. Mejority of livestock owners reared indigenoug animal (93.50 per cent) followed by cross breed (21.25 per cent) and non-descript animals (04.75 per cent). All the farmers in fodder camp provide feed and fodder as decided by state government i.e. adult animals were fed with 15 kg green fodder, 6 kg dry fodder and 0.500 kg concentrates whereas growing animals were fed with 7.5 kg green fodder, 3 kg dry fodder and 0.250 kg concentrates, respectively. In management practises vaccination and health checking of animal were followed 100 per cent, while cleaning and sanitation of camp and animal practiced by 96.50 per cent. Artificial insemination technique was followed by 77.25 per cent farmers, whereas 29.50 per cent of respondent followed mating of animal at right time. In production performance, the majority of cows i.e 40.76 per cent were yielding 2.1 to 4 liters milk per day whereas majority of buffalos i.e 35.64 per cent yielding between 4.1 to 6 liters milk per day. In constains, feeding constraints, production and marketing

constraints, technical constraints and health related constraints were faced by farmer in livestock fodder camp. Hence it may be concluded that there is need to demonstrate scientific feeding and management practices, also management of fodder and water for summer season which is need for exploiting optimum production and proper management of livestock.

Title	-	**Studies on management practices followed for livestock fodder Camps during drought in patodatahsil of beed district**
Researcher	-	Kamble, AniketMaruti
Research Guide	-	Thombre, B.M.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17161
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034034

Abstract -

The present investigation entitled "Studies on Management Practices Followed for Livestock Fodder Camps during Drought in PatodaTahsil of Beed District" was undertaken to study the different package of practices followed for livestock. Four livestock fodder camp from Patodatahsil of Beed district were selected with the objectives to study the feeding, breeding, housing and health cover practices of livestock, to record the production performance and to study the constraints faced by the livestock owner.The data was collected from the 400 respondents in four livestock fodder camp. The study revealed that 27.25 per cent of the respondents were marginal farmers, 31.00 per cent of the respondents were small farmers, 37.50 per cent of the respondents were medium farmers, 04.25 percent of the respondents were large farmers while 00.00 per cent of the respondents landlesslabours respectively. Majority of livestock owners reared indigenous animal (94.75 per cent) followed by crossbred (30.25 per cent) and non-descript animal (05.25 per cent). All the farmers in fodder camp provide feed and fodder as recommend by state government *i.e*. adult animals were fed with 15 kg green fodder, 6 kg dry fodder and 0.500 kg concentrates whereas growing animals were fed with 7.5 kg green fodder, 3 kg dry fodder and 0.250 kg concentrates respectively. In management practices vaccination and health checking of animal were followed 100 per cent, while cleaning and sanitation of camp and animal practiced by 96.75 per cent. Artificial insemination technique was followed by 83.00 per cent farmers,where as 49.25 per cent of respondent followed the practice of natural service of animal. In production performance, the majority of cows*i.e* 35.91 per cent were yielding 2.1 to 4 liters milk per day where as majority of buffaloes *i.e* 33.06 per cent yielding between 4.1 to 6 liters milk per day. In constaints, feeding constraints, production and

marketing constraints, technical constraints and health related constraints were faced by farmer in livestock fodder camp. Hence it may be concluded that there is need to demonstrate scientific feeding and management practices, also management of fodder and water for summer season which is need for exploiting optimum production, health and proper management of livestock.

Title	-	**Studies on marketing of goat in latur district**
Researcher	-	Naik, SachinDharmapal
Research Guide	-	Shinde, A.T.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry
Degree	-	M.Sc
Thesis No.	-	17169
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034054

Abstract -

The study entitled 'Studies on Marketing of Goat in Latur District'.was under taken with objectives. To study the general trade practices, to study the cost of goat, to study the constraints in marketing of goat, to suggest the ways and means for marketing of goat. Instead of studying all markets, four markets as per geographical distribution of districts were selected *viz.*,Latur, Renapur, Murud and Nalegaon goat marketsMajority of 38.33 per cent small and 31.63 per cent medium land holders were involved in the sale and purchase of goats. Osmanabadi breed with 83.33 per cent black colour of goats were preferred by sellers and buyers mostly local market Latur. Mainly adult goats, 60.00 per cent were sold and 73.33 per cent purchased by farmers in selected markets of Laturdistrict.Majority of farmers from Latur district adopted 50.00 per cent broker method followed by 46.63 per cent direct method for marketing of goats.Availability of fodder, drinking water, goat shed was not properly available in the markets.Major reasons for sale of goats were 45.00 per cent fodder problem, 26.67 per cent financial problem.

Title	-	**Studies on preparation of rice bran brown *peda***
Researcher	-	Dixit, Gauri Vijay
Research Guide	-	Shinde, A.T.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17175
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034061
Abstract	-	

Peda is highly nutritious khoa based sweet as it contains milk solids plus sugar and other additives. The quantity of *peda* produced in India exceeds than other khoa based sweets (Mahadevan, 1991).*Peda* has immense importance in various celebrations. Hindus mostly offer peda to god as a 'Prasad' which is then distributed to people. Hence, *peda* has good demand throughout year.Now a days dietary fiber is gaining more importance in human diet due to its important role in human health. Rice bran contains 25.30 gm of dietary fiber per 100 gm and as per WHO the requirement of dietary fiber in human diet is 23-27 gm/day.Rice bran consists of 20-29% oil, 10-15% proteins and 20-27% fibers. It is considered as good source of protein, minerals, B-group vitamins and dietary fiber. The rice bran is good source of B-complex vitamins (Riboflavin, niacin, thiamine), trace minerals (Ca, K, P, Mg and Niacin) in small quantities and indigestible cellulose (B. S. NarsingaRao 2000).NarsingaRao (2000) stated that rice bran was good source of protein (16.5 gm/100 gm) , fat (21.3gm/100gm) , carbohydrate (49.4gm/100gm), mineral (8.3gm/100gm), crude fiber (11.4gm/100gm), starch (24.2gm/100gm), total sugar (5.0gm/100gm),thiamin (3.0mg/100gm), riboflavin (0.4mg/100gm), niacin (43mg/100gm). Rice bran is used as supplement source of dietary fiber for prevention of arthrosclerosis diseases. The role of dietary fiber in offering protection against diabetics and heart disease is well established. It is also helps in execution of faces due to increased peristalsis Research workers have tried different vegetables, fruits and nuts in milk products such as *gajarkahalwa, kajubur*fi and *sohanhalwa*, with an aim to improve nutrient, fiber content, texture, mouthfeel and flavor. The present study entitled "Studies on preparation of Rice Bran Brown *Peda*" was conducted with the aim to investigate suitable method for incorporation of rice bran

in brown peda, having suitable treatment combinations. After preliminary trials three levels *viz*. 0.2, 0.4, 0.6 per cent were selected to add rice bran in brown *peda*. Three levels were compared to control and results obtained were statistically analyzed to arrive at suitable conclusion. From the results it was observed that addition of rice bran in brown peda increased in moisture (13.48 to 14.58 per cent), fat (21.10 to 21.27 per cent), protein (15.70 to 16.28 per cent) and fiber (0.0 to 0.41 per cent) and decreased ash (2.64 to 2.26 per cent) and total solid (86.51 to 85.42 per cent) content significantly in treated product as compared to control. Also observed that control brown *peda* rated highest score for colour and appearance (8.75), flavour (8.65), body and texture (8.67) and overall acceptability (8.66) than treated samples. Though sensory score was decreased in treated product however addition of rice bran up to 0.4 per cent does not rejected the product by sensory panel. Brown *Peda* was evaluated for textural properties *viz*. hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness of the treatment T_0 was 40.959, 0.161, 0.166, 7.920 6.618 and 52.422, for treatment T_1 was 31.007, 0.125, 0.125, 7.923, 3.888 and 30.806, for treatment T_2 was 23.018, 0.097, 0.155, 7.920, 2.245 and 17.787, for treatment T_3 was 20.674, 0.105, 0.179, 7.920, 2.170 and 20.674 respectively. Cost structure of product showed that, treated brown *peda* cost was decreased from Rs. 182.83 to 181.39 as compared to control Rs. 183.56. This may be due to slightly higher yield and low price of rice bran.

Title	-	**Studies on preparation finger millet *kheer***
Researcher	-	Solanki, Kailas Ganesh
Research Guide	-	Narwade, S.G.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17184
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034084

Abstract -

The present study was carried out on "Studies on preparation of finger millet *kheer"*. The research was conducted in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, VasantraoNaikMarathwadaKrishiVidyapeeth, Parbhani during the year 2016-17. *Kheer* was prepared from buffalo milk with constant level of sugar 7 per cent weight of milk and different level of finger millet powder (2, 4 and 6 per cent by weight of milk). On an average finger millet *kheer* of treatment T_0, T_1, T_2 and T_3 content moisture 58.58, 63.58, 61.45 and 58.13 per cent ; fat 1510.79, 9.25, 8.85 and 8.15 per cent; protein 6.79, 7.18, 7.34 and 7.44 per cent; carbohydrate 22.43, 18.65, 20.99 and 24.88 per cent ; ash 1.43, 1.36, 1.38 and 1.41 per cent and total solid be 41.43, 36.43, 38.55 and 41.88 per cent, respectively. It was observed that overall acceptability score for treatment T_0, T_1, T_2 and T_3 were 8.58, 8.25, 7.25 and 6.46, respectively. As the level of finger millet powder in *kheer* increases the overall acceptability score decreases. The highest score for overall acceptability was found to be 8.25 (like very much) and lowest score was found to be 6.46 (like slightly).Cost of control *kheer* was found to be lowest for T_0 asRs.84.30 per lit. The highest cost was recorded for treatment T_3 as Rs 108.60 per lit. The cost for treatment T_1 and T_2 were Rs. 91.40 and Rs. 100 per lit, respectively. As the level of finger millet powder in *kheer* increases the cost of production increases.

Title	-	**Studies on morphometric, production and reproduction performance of red kandhari cattle in marathwada region**
Researcher	-	Bainwad, D.V.
Research Guide	-	Thombre, B.M.
Department	-	Animal Husbandry and Dairy Science
Subject	-	Animal Husbandry and Dairy Science
Degree	-	Ph.D.
Thesis No.	-	17201
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034156
Abstract	-	

The present study entitled "Studies on Morphometric, Production and Reproduction Performance of Red Kandhari Cattle in Marathwada Region" was undertaken on Red Kandhari cattle in the breeding tract i.e. Nanded, Latur, Hingoli, Parbhani and Beed districts of Marathwada region in Maharashtra state.The present work was intended to study the body measurements and body weight of Red Kandhari cattle at various stages of growth for different sex (male and female) at different locations in the breeding tract and also to study the production, reproduction, colour pattern and off type characteristics.

The overall LSM at 0-3 months of Red Kandhari for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, fore legs length and hind legs length were 51.65 $\pm$ 0.62 kg, 73.44 $\pm$ 0.51, 63.13 $\pm$ 0.44, 71.56 $\pm$ 0.58, 76.45 $\pm$ 0.50, 72.19 $\pm$ 0.56, 60.36 $\pm$ 0.28, 23.70 $\pm$ 0.19, 37.88 $\pm$ 0.62, 18.66 $\pm$ 0.22, 58.90 $\pm$ 0.31 and 38.05 $\pm$ 0.17cm, respectively. The sex and districts showed non-significant effect on all the traits for Red Kandhari cattle at 0-3 months of age. The overall LSM at 4-6 months of Red Kandhari for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, fore legs length and hind legs length were 114.15 $\pm$ 1.09 kg, 107.25 $\pm$ 0.53, 95.64 $\pm$ 0.68, 96.03 $\pm$ 0.45, 113.47 $\pm$ 0.52, 97.87 $\pm$ 0.45, 72.68 $\pm$ 0.44, 34.22 $\pm$ 0.17, 60.91 $\pm$ 0.16, 19.14 $\pm$ 0.13, 70.12 $\pm$ 0.36 and 42.78 $\pm$ 0.14 cm, respectively.The sex showed significant ($P<0.01$) effect on body weight and non-significant effect on rest of the traits, whereas districts showed significant ($P<0.05$) effect on body weight and non-significant effect on rest of the traits, respectively for Red Kandhari

cattle at 4-6 months of age. The overall LSM at 7-12 months of Red Kandhari for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, fore legs length and hind legs length were 132.02 ± 1.21 kg, 114.53 ± 0.51, 103.66 ± 0.73, 100.75 ± 0.56, 121.71 ± 0.50, 104.42 ± 0.56, 77.99 ± 0.54, 36.43 ± 0.24, 65.98 ± 0.23, 20.44 ± 0.13, 73.88 ± 0.41 and 44.50 ± 0.14 cm, respectively.The sex showed significant (P<0.01) effect on body weight and non-significant effect on rest of the traits, whereas districts showed non-significant effect on all the traits, for Red Kandhari cattle at 7-12 months of age. The overall LSM at 13-24 months of Red Kandhari for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, horn length, fore legs length and hind legs length were 195.12 ± 1.92 kg, 147.36 ± 0.67, 118.73 ± 0.92, 119.84 ± 0.47, 155.46 ± 0.68, 124.44 ± 0.57, 94.64 ± 0.55, 46.20 ± 0.17, 80.82 ± 0.33, 23.31 ± 0.11, 6.32 ± 0.08,86.04 ± 0.30 and 51.10 ± 0.19 cm, respectively. The sex showed significant (P<0.01) to significant (P<0.05) effect on most of the traits, whereas districts showed significant (P<0.01) influence on body weight and non-significant effect on rest of the traits, for Red Kandhari cattle at 13-24 months of age.

The overall LSM at 25-36 months of Red Kandhari for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, horn length, fore legs length and hind legs length were 236.93 ± 1.73 kg, 158.44 ± 0.51, 132.56 ± 0.67, 129.76 ± 0.37, 168.31 ± 0.49, 133.17 ± 0.36, 107.12 ± 0.40, 48.69 ± 0.14, 90.00 ± 0.32, 24.25 ± 0.08, 9.56 ± 0.09,91.26 ± 0.24 and 54.39 ± 0.25 cm, respectively. The sex showed significant (P<0.01) effect on body weight, height at wither and height at hip bone and significat(P<0.05) effect on length of body at trunk and non-significant effect on rest of the traits, whereas districts showed significant (P<0.01) on body weight, chest girth and belly girth and non-significant effect on rest of the traits, for Red Kandhari cattle at 25-36 months of age. The overall LSM at more than 36 months of age of Red Kandhari male for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, horn length, fore legs length and hind legs length were 302.92 ± 1.73 kg, 178.27 ± 0.46, 143.94 ± 0.51, 141.24 ± 0.39, 194.07 ± 0.54, 144.97 ± 0.39, 111.45 ± 0.29, 56.36 ± 0.16, 99.06 ± 0.20, 26.09 ± 0.10, 16.02 ± 0.24,97.18 ± 0.16 and 55.72 ± 0.10 cm, respectively. The districts showed significant (P<0.05) to highly significant (P<0.01) effect on body weight, chest girth, body length and belly girth, whereas non-significant effect on rest of the traits,

for Red Kandhari male at more than 36 months of age. The overall LSM at more than 36 months of age of Red Kandhari female for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, horn length, fore legs length and hind legs length were 297.02 ± 2.42 kg, 164.55 ± 0.38, 142.69 ± 0.68, 144.06 ± 0.71, 177.98 ± 0.39, 148.91 ± 0.66, 102.18 ± 0.10, 49.52 ± 0.14, 96.83 ± 0.19, 24.94 ± 0.07, 18.75 ± 0.18,86.29 ± 0.16 and 52.89 ± 0.12 cm, respectively. The districts showed significant ($P<0.01$) effect on body weight, whereas non-significant effect on rest of the traits, for Red Kandhari female at more than 36 months of age. The overall LSM of Red Kandhari Breeding bull for body weight, chest girth, body length, height at wither, belly girth, height at hip bone, length of body at trunk, face measurement, tail length, ear length, horn length, fore legs length and hind legs length were 343.90 ± 9.39 kg, 185.63 ± 2.30, 157.15 ± 3.25, 149.64 ± 2.71, 195.62 ± 2.08, 154.56 ± 2.59, 108.67 ± 1.78, 56.45 ± 0.99, 99.34 ± 0.58, 27.64 ± 0.44, 12.71 ± 0.99,96.87 ± 0.82 and 55.55 ± 0.84 cm, respectively. The districts showed significant ($P<0.01$) effect on body weight, chest girth and belly girth and significant ($P<0.05$) effect on body length,whereas non-significant effect on rest of the traits, for Red Kandhari Breeding bull. The body weight at all the age groups were positive and highly correlated with height at withers, chest girth and body length. Similarly, the different body measurements at all the age groups also indicated positive and highly significant correlations between each other; except at 25-36 month age (Female) group chest girth and body length were non significant and positive correlations with height at withers.

The overall least square means for lactation milk yield (LMY) of Red Kandhari cattle was recorded as 417.28 ± 1.09 kg. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on LMY for Red Kandhari cattle as 416.77 ± 1.76, 415.59 ± 1.79, 412.10 ± 1.64, 420.09 ± 2.01 and 422.84 ± 3.17 kg, respectively.The estimated effect of colour pattern C_1 and C_2 on LMY for Red Kandhari cattle as 417.99 ± 1.31 and 416.56 ± 1.40 kg, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on LMY for Red Kandhari cattle as 371.82 ± 2.62, 400.22 ± 2.47, 476.20 ± 1.42 and 420.86 ± 1.35 kg, respectively. The districts showed significant ($P<0.05$) effect and colour showed non-significant effect, whereas season showed highly significant ($P<0.01$) effect on LMY in Red Kandhari cattle, respectively. The overall least square means for peak milk yield (PMY) of Red Kandhari cattle was recorded as 2.63 ± 0.01 kg. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on PMY for Red Kandhari cattle as 2.70 ± 0.02, 2.70 ± 0.02, 2.58 ± 0.02, 2.54 ± 0.02 and 2.60 ± 0.03 kg, respectively.The estimated effect of colour pattern C_1 and C_2 on PMY for Red Kandhari

cattle as 2.63 ± 0.01 and 2.62 ± 0.01 kg, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on PMY for Red Kandhari cattle as 2.68 ± 0.03, 2.52 ± 0.02, 2.65 ± 0.01 and 2.65 ± 0.01 kg, respectively. The districts, colour and season showed non-significant effect on PMY in Red Kandhari cattle, respectively. The overall least square means for days to reach peak milk yield (DRPMY) of Red Kandhari cattle was recorded as 39.48 ± 0.09 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on DRPMY for Red Kandhari cattle as 38.62 ± 0.15, 39.47 ± 0.15, 40.32 ± 0.13, 40.25 ± 0.16 and 38.74 ± 0.26 days, respectively.The estimated effect of colour pattern C_1 and C_2 on DRPMY for Red Kandhari cattle as 39.54 ± 0.12 and 39.42 ± 0.11 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on DRPMY for Red Kandhari cattle as 40.05 ± 0.22, 39.00 ± 0.20, 39.94 ± 0.12 and 38.93 ± 0.11 days, respectively. The districts, colour and season showed non-significant effect on DRPMY in Red Kandhari cattle, respectively. The overall least square means for lactation period (LP) of Red Kandhari cattle was recorded as 242.64 ± 0.46 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on LP for Red Kandhari cattle as 238.29 ± 0.74, 245.33 ± 0.76, 245.20 ± 0.69, 248.50 ± 0.85 and 235.91 ± 1.34 days, respectively.The estimated effect of colour pattern C_1 and C_2 on LP for Red Kandhari cattle as 242.66 ± 0.56 and 242.63 ± 0.59 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on LP for Red Kandhari cattle as 239.83 ± 1.11, 242.80 ± 1.04, 246.49 ± 0.60 and 241.46 ± 0.57 days, respectively. The districts showed highly significant ($P<0.01$) effect, whereas colour and season showed non-significant effect on LP in Red Kandhari cattle, respectively. The overall least square means for dry period (DP) of Red Kandhari cattle was recorded as 180.79 ± 0.56 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on DP for Red Kandhari cattle as 178.52 ± 0.91, 178.87 ± 0.93, 183.74 ± 0.85, 179.64 ± 1.04 and 183.18 ± 1.64 days, respectively.The estimated effect of colour pattern C_1 and C_2 on DP for Red Kandhari cattle as 180.68 ± 0.68 and 180.90 ± 0.72 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on DP for Red Kandhari cattle as 185.81 ± 1.35, 183.16 ± 1.27, 176.55 ± 0.73 and 177.65 ± 0.70 days, respectively. The districts and colour showed non-significant effect, whereas season showed significant ($P<0.05$) effect on DP in Red Kandhari cattle, respectively.

The overall least square means for age at puberty (AP) of Red Kandhari cattle was recorded as 883.16 ± 0.83 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on AP for Red Kandhari cattle as 885.63 ± 1.35, 878.82 ± 1.38, 878.04 ± 1.26, 886.53 ± 1.54 and 886.78 ± 2.43 days, respectively.The estimated effect of colour pattern C_1 and C_2 on AP for Red Kandhari

cattle as 883.04 ± 1.01 and 883.28 ± 1.08 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on AP for Red Kandhari cattle as 878.48 ± 2.01, 891.97 ± 1.89, 883.81 ± 1.09 and 878.37 ± 1.03 days, respectively. The districts showed highly significant (P<0.01) effect and colour showed non-significant effect, whereas season showed highly significant (P<0.01) effect on AP in Red Kandhari cattle, respectively. The overall least square means for age at first estrus (AFE) of Red Kandhari cattle was recorded as 1236.96 ± 1.67 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on AFE for Red Kandhari cattle as 1238.51 ± 2.72, 1238.61 ± 2.77, 1244.58 ± 2.53, 1235.41 ± 3.09 and 1227.71 ± 4.89 days, respectively.The estimated effect of colour pattern C_1 and C_2 on AFE for Red Kandhari cattle as 1237.69 ± 2.03 and 1236.24 ± 2.16 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on AFE for Red Kandhari cattle as 1256.59 ± 4.04, 1243.33 ± 3.80, 1210.19 ± 2.19 and 1237.75 ± 2.08 days, respectively. The districts showed highly significant (P<0.01) effect and colour showed non-significant effect, whereas season showed highly significant (P<0.01) effect on AFE in Red Kandhari cattle, respectively. The overall least square means for age at first calving (AFC) of Red Kandhari cattle was recorded as 1529.61 ± 1.71 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on AFC for Red Kandhari cattle as 1533.43 ± 2.77, 1530.72 ± 2.82, 1528.31 ± 2.58, 1531.56 ± 3.16 and 1524.06 ± 4.98 days, respectively.The estimated effect of colour pattern C_1 and C_2 on AFC for Red Kandhari cattle as 1528.86 ± 2.07 and 1530.37 ± 2.20 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on AFC for Red Kandhari cattle as 1525.78 ± 4.12, 1553.08 ± 3.88, 1510.28 ± 2.23 and 1529.32 ± 2.12 days, respectively. The districts and colour showed non-significant effect, whereas season showed highly significant (P<0.01) effect on AFC in Red Kandhari cattle, respectively. The overall least square means for service period (SP) of Red Kandhari cattle was recorded as 139.92 ± 0.66 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on SP for Red Kandhari cattle as 132.90 ± 1.07, 140.22 ± 1.10, 145.69 ± 1.00, 145.20 ± 1.22 and 135.59 ± 1.93 days, respectively.The estimated effect of colour pattern C_1 and C_2 on SP for Red Kandhari cattle as 139.72 ± 0.80 and 140.13 ± 0.85 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on SP for Red Kandhari cattle as 140.60 ± 1.60, 145.93 ± 1.51, 139.92 ± 0.87 and 133.23 ± 0.82 days, respectively. The districts showed highly significant (P<0.01) effect and colour showed non-significant effect, whereas season showed highly significant (P<0.01) effect on SP in Red Kandhari cattle, respectively. The overall least square means for gestation period (GP) of Red Kandhari cattle was recorded as 283.49 ± 0.23 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on GP for Red Kandhari cattle as

283.88 ± 0.38, 283.98 ± 0.39, 283.25 ± 0.35, 282.93 ± 0.43 and 283.42 ± 0.68 days, respectively.The estimated effect of colour pattern C_1 and C_2 on GP for Red Kandhari cattle as 283.60 ± 0.28 and 283.39 ± 0.30 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on GP for Red Kandhari cattle as 285.04 ± 0.57, 280.01 ± 0.53, 283.07 ± 0.31 and 285.86 ± 0.29 days, respectively.The districts, colour and season showed non-significant effect on GP in Red Kandhari cattle, respectively. The overall least square means for inter calving period (ICP) of Red Kandhari cattle was recorded as 423.42 ± 0.61 days. The estimated effect of district D_1, D_2, D_3, D_4, and D_5 on ICP for Red Kandhari cattle as 416.78 ± 0.99, 424.20 ± 1.01, 428.94 ± 0.92, 428.14 ± 1.13 and 419.02 ± 1.78 days, respectively.The estimated effect of colour pattern C_1 and C_2 on ICP for Red Kandhari cattle as 423.31 ± 0.74 and 423.52 ± 0.79 days, respectively.The estimated effect of season S_1, S_2, S_3 and S_4 on ICP for Red Kandhari cattle as 425.64 ± 1.47, 425.94 ± 1.39, 422.99 ± 0.80 and 419.09 ± 0.76 days, respectively. The districts showed highly significant ($P<0.01$) effect, whereas colour and season showed non-significant effect on ICP in Red Kandhari cattle, respectively.

The Correlations for productive characters in Red Kandhari cows revealed that LMY is positively correlated and highly significant with PMY and LP, whereas negatively correlated and highly significant with DRPMY and DP. The PMY is positively correlated and highly significant with LP, whereas negatively correlated and highly significant with DRPMY and DP. The DRPMY is positively correlated and highly significant with DP, whereas negatively correlated and highly significant with LP. The LP is negatively correlated and highly significant with DP. The Correlations for reproductive characters in Red Kandhari cows revealed that AP is positively correlated and highly significant with AFE, AFC and SP, whereas negatively correlated with GP and ICP. The AFE is positively correlated and highly significant with AFC, SP and positively correlated with ICP, whereas negatively correlated with GP. The AFC is positively correlated and highly significant with SP, positively correlated with GP, whereas negatively correlated with ICP. SP is positively correlated with GP and ICP, whereas GP is negatively correlated with ICP.

The total percentage of colour variation in the breeding tract of Red Kandhari cattle was Dark Red (38.99), Brick Red (57.20) followed by Black Shades on NST i.e. Neck, Shoulder and Thigh (3.80). The total percentage of off-type characters in the breeding tract of Red

Kandhari cattle i.e. Mixture of Red and White colour (MRW), Absence of Black Rings around eyes and hoofs (ABR), Red Hairs in the Switch of tail (RHS), Loose skin (LS), Pendulous Dewlap (PD), Heavy Sheath (HS), Long Drawn Mouth (LDM), Roman Arched Face (RAF), Inclination of Hump to the Side (IHS), Red Eye Lashes (REL) and Carroty Hooves, Horns and Muzzle (CHM) in Red Kandhari cattle in the breeding tract were 6.96, 5.08, 2.27, 0.39, 1.27, 0.39, 1.14, 0.48, 0.17, 2.54 and 4.11, respectively.

On the basis of the results it can be concluded that The effect of district was found significant to highly significant on body weight in all Red Kandhari cattle age group, except 0-3 months in both sex. The effect of district was found significant to highly significant on chest girth and belly girth in 25-36 months age group in both the sex and chest girth, body length and belly girth in > 36 month male and breeding bull group of animals. Hence it is concluded that geo-ecological situations of surveyed area and management practices followed there plays an important role on physical measurements parameters of Red Kandhari cattle. The effect of sex was found highly significant on most of body measurements and body weight in Red Kandhari cattle at 13-24 and 25-36 age groups. Hence it is concluded that the transitional phase of attaining puberty which regulates reproductive life. The effect of district was found significant to highly significant on lactation milk yield (LMY) and lactation period (LP), whereas the effect of season found highly significant on lactation milk yield (LMY) and significant on dry period (DP). Hence it is concluded that the management practices, available water and feed resources and climatic condition followed there plays an important role on productive performance of Red Kandhari cattle. The effect of district and season were found highly significant on age at puberty (AP), service period (SP). Hence it is concluded that the management practices, available water and feed resources and climatic condition followed there plays an important role on reproductive performance of Red Kandhari cattle. The colour pattern observed in Red Kandhari Cattle were *Brick red* colour pattern was found predominant followed by *Dark red* and *Black shades on Neck, Shoulder and Thigh region*. The off type characteristics i.e. mixture of red and white colour (MRW) was recorded highest percent in population followed by absence of black rings around eyes and hoofs (ABR), carroty hooves, horns and muzzle (CHM), red eye lashes (REL), red hairs in the switch of tail (RHS), long drawn mouth (LDM), pendulous dewlap (PD), heavy sheath (HS), roman arched face (RAF), loose skin (LS) and inclination of hump to the side (IHS). To maintain the genetic purity of Red Kandhari cattle, in future it is needed to plan

breeding strategy for conservation of Red Kandhari cattle at farmers / breeders herd level in Marathwada region. Formation of "Breed Society and Registration of Herds" is essential in future.

Title	-	**Utilization of green peas (pisumSativum) in preparation of *burfi***
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Subject	-	Animal Husbandry and Dairy Science
Degree	-	M.Sc
Thesis No.	-	17214
Krishikosh link	-	http://krishikosh.egranth.ac.in/handle/1/5810034191
Abstract	-	

The present study was carried out on "Utilization of green pea in preparation of *burfi"*. The research was conducted in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, VNMKV, Parbhani during the year 2015-16. *Burfi* was prepared from buffalo milk with constant level of sugar (30 per cent by weight of *khoa*) and different levels of green peas(2, 4, 6 and 8 per cent by weight of *khoa*). It was observed that the overall acceptability score for treatment T_1, T_2, T_3 and T_4 were 8.20, 7.50, 6.70 and 6.10 respectively. As the level of green peas in *burfi* increases the overall acceptability score decreases. The highest score for overall acceptability was found to be 8.20 for 5 parts green peas (like extremely) and lowest score was found to be 6.10 (like moderately to like very much for parts). On an average green peas *burfi* of treatment T_1, T_2, T_3 and T_4 contained moisture 17.76, 16.25, 16.65 and 16.41 per cent; fat 22.20, 21.730, 20.58 and 20.50 per cent; protein 15.00, 14.86, 14.35 and 14.04 per cent; ash 2.73, 2.65, 2.43 and 2.36 per cent; carbohydrate 43.55, 44.59, 45.50 and 46.10 and total solids 82.24, 83.75, 83.35 and 83.59 per cent, respectively.

Burfi sample was evaluated for textural qualities viz., Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness. Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness of the treatment (T_1) was 0.4730, 0.2098, 0.004, 15.090, 0.0992 and 1.4969 for treatment, T_2 was 0.4780, 0.1316, 0.000, 15.210, 0.0629 and 0.9567, for treatment T_3 was 0.4820, 0.1695, 0.000, 15.155, 0.0816 and 1.2366, and for treatment T_4 was 0.5355, 0.1160, 0.000, 15.175, 0.0621 and 0.9423 respectively.