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MILK YIELD AND COMPOSITION OF DAIRY CATTLE DURING DRY SEASON IN SELECTED DAIRY FARMS IN KANO STATE, NIGERIA

Shitu, A., Abubakar, M. and Sanusi, M.
Department of Animal Production, Abubakar Tafawa Balewa University, Bauchi, P.M.B 0248, Bauchi State, Nigeria.
Corresponding Author's E-mail: abbashitu7999@gmail.com **Tel.:** +2348069449018

ABSTRACT
The aim of the study was to assess the milk yield and composition of dairy cattle of different locations during dry season in selected dairy farms in Kano state. One hundred and twenty lactating cows (different stages of lactation) include Bunaji, Bokoloji, Fresian x Bunaji were used, ten from each twelve dairy farms to assess milk yield and composition. Daily milk yield was recorded for two months. Five milk samples from each farm were analysed for its composition. Danbatta farm was the best in average daily milk yield (ADMY) of 3.86l, Dantube farm was the lowest of 2.49l which differ ($p<0.001$), Imawa arewa, Asibitin tafasa and Lautaye farms didn't vary other farms differ. Fat(%) did not vary in all the farms, TS(%) Total solid, TA(%) Titrable acidity, CP(%) Crude protein, Ash(%), SNF(%) Solid non fat differ ($p<0.001$). Tsaunin fulani farm was the best in Fat(%) 4.26, Asibitin tafasa farm was the lowest of 3.84. Lautaye was the best in TS(%) 57.2, Dakatsalle was the lowest of 38.8. Imawa arewa was the best TA(%) of 0.38, Dakatsalle, Kuki and shinkafi farms are the lowest of 0.29. Imawa arewa, Danbatta and Kwanar dumawa farms are the best in CP(%) 4.24, Kuki farm was the lowest of 3.46. Dantube farm was the best in Ash(%) of 0.54, Dakatsalle, Kuki are the lowest of 0.32. Lautaye was the best in SNF(%) 52.96, Dakatsalle farm was the lowest of 34.6. Fat(%) differ ($p<0.05$), TS(%) ($p<0.001$) among the breeds while their ADMY, TA(%), CP(%), Ash(%), SNF(%) did not vary. Bunaji was the best in Fat(%) of 4.22, TS(%) 50.2, SNF(%) 45.74 with ADMY of 2.74l. Fresian x Bunaji was superior in CP(%) 4.24, lowest in Fat(%) 3.88, Ash(%) 0.44, TS(%) 39.2, SNF(%) 35.32 with the best ADMY of 4.01l. Bokoloji was superior in Ash(%) of 0.47 lowest in TA(%) 0.31 with ADMY of 2.67l. Therefore, Danbatta farm, Fresian x Bunaji with the best milk yield, Tsaunin fulani farm with the best Fat(%), Lautaye farm TS(%), Imawa arewa TA(%), Imawa arewa, Danbatta and Kwanar dumawa farms CP(%), Dantube farm Ash(%), Lautaye farm SNF(%), Bunaji breed with the best Fat(%), TS(%), TA(%), SNF(%), Bokoloji breed Ash(%), Fresian x Bunaji CP(%) was recommended. Milk yield and composition varied between dairy breeds, herds of the same breed and even between individual cows of a breed.

Keywords: Dairy cattle, Milk yield, Milk chemical composition, Herds, Kano State.

INTRODUCTION
Tropical countries have been reported to have over 50% of the world bovine population and Nigeria has been reported to be one of the leading countries in cattle production in Sub-Saharan Africa (Nayak *et al.,* 2018). Over 90% of these populations are traditionally managed in the Northern part of Nigeria. Also, over 80% of these are also managed by traditional pastoralists (Kubkomawa, 2017). It is well known that most Fulani pastoralists keep cattle mainly for beef production and only depend on the sales of the extractable milk to augment the income of the female members of their family. Such milk could also serve as a source of milk offtake for home consumption (Tona *et al.,* 2015).

In the transhumance system of ruminant livestock management, the pastoralists do have permanent homestead and bases, however, their animals depend on natural forages, grasses and legumes for subsistence. (Tona *et al.* 2015) explained that the agro-pastoral system of cattle production in Nigeria provides feeds for ruminants mainly from the rangeland. However, there is difficulties particularly during the dry season when there is low nitrogen content of the fodder. The use of conventional feedstuffs such as maize, soya, groundnut cake etc to enhance production has become inappropriate owing to their exorbitant costs and erratic supply (Akinmutimi, 2004). Some irrigation practices produce feed biomass as a byproduct (grass along water channels, field plots, inedible vegetables waste and crops harvested-green) which serves as a source of supplemental feeds (Haileslassie *et al.*, 2009).

Milk, the result of various biochemical activities in mammary secretary cell is made up of fat, protein, carbohydrates, enzymes, vitamins and various minerals (Brinez *et al.*, 2003). Fresh milk is considered complete diet because it supplies the essential nutrients in a balanced form than other foods. Physicochemical analysis is an important tool used to monitor the quality of milk and other dairy products. (Hossain and Dev, 2013). The current interest in the composition of milk is probably due to its nutritional importance in human diet and however, the composition is not absolute as many factors influence the end products. These variations can be related to animal breeds, season/weather condition during milking locality, stages of lactation, age, size of cow, herd management, environmental and dietary composition (Smith *et al.*, 2013).

The knowledge of relationship between milk production and milk composition traits is beneficial in the formulation of programmes for selection and improvement of milk quantity and quality of dairy cattle (Alphonsus and Essien, 2012). Therefore, the aim of this study was to assess milk yield and composition of dairy cattle during dry season in selected herds in Kano State, to serve as a base line data for improving the common indigenous breeds of dairy cattle for better milk production.

MATERIALS AND METHODS

The Study Area

Kano is located in the North west between latitude 12.00^{o}N of the equator and longitude 83.59^{o}E of the green which meridian. Kano is made up 44 Local government areas. Land mass of 20,131km^{2} (KNARDA, 2006). Estimated population of 13,076,892 (Census, 2006). The mean annual temperature of 26^{o}C, short rainy season starts in May and ends in October followed by long dry season which starts in November and lasts till April. Main occupation of the areas is crop and livestock production. Mean relative humidity of 23-80% (Google Maps 2013)**.** The study was carried in 6 LGs: Bunkure, Kura, Dawakin tofa, Dawakin kudu, Kumbotso and Bebeji LGs, 2 Dairy farms each making 12 dairy farms.

Data Collection, Experimental Animals, Feeds and Feeding System

Data for the study were collected with the aid of trained enumerators from Kano Dairy Cooperative Union (KDCU). The experiment was carryout between the month of March and April, 2022. One hundred and twenty lactating cows (different stages of lactation) made up of Bunaji, Bokoloji and Bunaji x Fresian in selected farms (12) in Kano state were used for the experiment. The calves were allowed to suckle their dam before milking. The cows were milked using hand milking in the morning at once a day. The farms have varying time of milking depend on farm management between 6 to 11am. Concentrate supplements were given to the lactating cows mostly after evening grazing at 3.5kg local breeds, 3.5-4.5kg for crosses. Animal sources of water include borehole, rivers, tiga dam irrigation channels and solar water supply system. Daily milk yields were recorded with calibrated container "Kwano (1.25l)"

known by Funali people of the areas, estimated sometimes. The research farms included the following:

Dawakin Tofa LG. farm (1), Dawanau Tasa Asibitin Tafasa cluster and Farm (2), Dawanau Tasa kwanar Dumawa cluster, Bokoloji breed

Postharvest crop residue e.g., rice hay**,** vegetables crop residue of irrigation farming e.g cucumber straw**,** agro-industrial by products, cotton seed cake (CSC) 70%, Rice bran (RB) 30%.

Dawakin Kudu LG. farm (3), Behun, Bokoloji breed

Postharvest crop residue e.g., sorghum stover, crop residues of irrigation farming e.g maize stover, agro-industrial by products, palm kernel cake (PKC) 30%, CSC 50%, RB 20%.

Dawakin kudu LG. farm (4), Dantube, Bunaji breed

Postharvest crop residues**,** crop residues of irrigation farming e.g., maize stover, agro-industrial by products, CSC 50%, rice bran 20%, maize bran 20%, poultry litter 10%.

Bebeji LG. Kuki, farm (5), and farm (6), Dakatsalle Farm, Bunaji breed

Postharvest crop residues**,** crop residues of irrigation farming e.g maize stover, agro-industrial by products, cotton seed cake 70%, rice bran 30%.

Kumbotso LG. farm (7), Danbatta farm, Fresian x Bunaji breed

Postharvest crop residues e.g., dried maize stover, agro-industrial by products, cotton seed cake 40%, sesame offal 25%, wheat offal 20%, *Bauhinia thonningii* (Kalgo) 15%.

Kumbotso LG. farm (8), Mariri farm, Bokoloji breed

Postharvest crop residue e.g., cowpea haulms**,** agro-industrial by products, cotton seed cake/palm kernel cake 70% + Rice bran 30%.

Bunkure LG. farm (9), Shinkafi cluster and farm (10), Lautaye cluster, Bunaji breed

Postharvest crop residue e.g., sorghum stover, vegetables crop residue of irrigation farming e.g tomato straw**,** agro-industrial by products, cotton seed cake (CSC) 50%, Palm kernel cake (PKC) 20%, rice bran (RB) 30%.

Kura LG. farm (11), Imawa arewa cluster and farm (12), Tsaunin fulani cluster, Bunaji breed: Postharvest crop residue e.g., sorghum stover, vegetables crop residue of irrigation farming e.g., garden egg straw**,** agro-industrial by products, cotton seed cake (CSC) 70%, rice bran (RB) 30%.

Milk Samples Collection and Composition Traits Determined

Milk samples were collected from the animals three times in April, using 120ml clean white bottles with ice block in a preservative container, five milk samples from each dairy farms were taken to the Bayero University Kano (BUK), Animal science lab. for milk chemical compositions analysis. The milk was analysed for Milk protein, Milk fat, Solid nonfat, Total solid, Titrable acidity and Ash. The chemical compositions traits of milk were determined according to (AOAC, 2011) methods. Crude Protein (CP) content was obtained by determining the total nitrogen using Kjeldahl method and the nitrogen content was converted into equivalent protein content using N×6.25 as conversion factor. Ash was determined by igniting the sample in the crucible at 550^{o}C for 4hours. Total solid(%) was determined by Gravimetric method. Fat(%) content was determined by Gerber method. Titrable acidity was measured by titrimetric method and expressed as percent of lactic acid as described by (Jennings *et al.*, 2010). Solids-not-fat was determined by the difference between total solids and butterfat.

Data Analysis

The data obtained on milk yield and composition were subjected to analysis of variance (ANOVA) using statistical software package (Minitab version 17), while means with

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significant differences were separated using Duncan martins multiple range test (DMRT). Descriptive statistics of milk and compositions means, standard error of means and yield range.

RESULTS AND DISCUSSION

In (Table 1), Danbatta farm was the best in average daily milk yield (ADMY) of 3.86l, Dantube farm was the lowest of 2.49l which differ significantly ($p<0.001$). Similarly, (Tona *et al.,* 2017) reported the early, mid and late lactation milk yield (offtake) of the experimental Bunaji cows were significantly ($p<0.05$) higher in the cows that were given concentrate diet along with the grasses and legumes obtained from grazing range land than those without concentrate diet. Imawa arewa, Asibitin tafasa and Lautaye farms didn't vary in daily milk yield (DMY) other farms differ significantly. Similarly, (Ran *et al.,* 2010; Salman *et al.,* 2013; Hork, 2015), reported no significant difference in milk production in cows whose diet were supplemented with Selinium and concentrate. Dakatsalle, Kuki, Dantube and Behun farms have lowest minimum daily milk yield of 1l. Danbatta farm has the best maximum daily milk yield of 6.5l.

Table 1: Two months milk yield of dairy cattle in different farms (l)

	Parameters				
Farms	**ADMY**	**Min.**	**Max.**	**SEM(±)**	**P-value**
Imawa arewa	2.92	2.1	3.8	0.01	0.415 NS
Tsaunin fulani	2.89	2.0	3.9	0.01	0.014 *
Danbatta	3.86	2.0	6.5	0.04	0.000 ***
Mariri	2.69	1.1	3.9	0.02	0.000 ***
Asibitin tafasa	2.97	2.0	4.0	0.02	0.101 NS
Kwanar dumawa	2.92	2.0	3.8	0.01	0.036 *
Dakatsalle	2.62	1.0	3.5	0.02	0.000 ***
Kuki	2.64	1.0	3.9	0.02	0.000 ***
Shinkafi	2.92	2.0	3.9	0.02	0.039 *
Lautaye	2.88	2.0	3.8	0.02	0.538 NS
Dantube	2.49	1.0	3.9	0.03	0.000 ***
Behun	2.58	1.0	3.8	0.02	0.000***

ADMY=Average daily milk yield, Min.=Minimum, Max.=Maximum yield, SEM=Standard error of means, *($p<0.05$), ***($p<0.001$) differ significantly, NS=Not Significant.

In (Table 2), Bunaji was the best in ADMY of 2.74l compared to Bokoloji of 2.67l. In Bunaji the value is high compared to what was obtained in other places. In Bangladesh average yield was 1.19 litres (Saha and Haque, 2001) while in Cameroon it was 2.46 litres on average (Njire *et al.,* 2001) and in Tanzania it was 2.68 litres on the average (Kurwijila, 2001). The superiority of Bunaji in ADMY in this study suggest that the breed produces more milk than indigenous counterpart. Other researchers (Alphonsus, Abbaya, Adedibu, Kabir and Iyiola-Tunji *et al.,* 2012; Adesina, 2012) also reported that among the indigenous cattle breeds in Nigeria, Bunaji was identified as the principal producer. Milk yield is largely determined by genetic factors that depict low genotypic potential of the indigenous animals (Millogo, 2008). Milk yield are product of animal genetic and environmental interactions (Dandare *et al.,* 2014; Oladapo and Ogunekun, 2015). Fresian x Bunaji was superior in ADMY of 4.01l. The average milk yield/day fall within the range 3.43-5.81 litres as reported by (Finangwai, 2014) on feeding concentrate diets containing graded levels of groundnut haulms on the performance of Friesian x Bunaji cattle. The crossbred cows were superior to the pure breed in all the milk

yield characteristics. The higher milk yield of the Friesian x Bunaji over the pure Bunaji agreed with the principle of heterosis in animal breeding where by offspring of crosses are expected to perform above the average of the two parents (Legates and Warwick, 1990; Bryant *et al.,* 2005). The ADMYs obtained in this study is closer to 3.16, 3.29 and 2.53 kg/day reported by (Olafadehan *et al.,* 2010) for grazing + 60% corn bran+ 40% palm kernel in Bunaji. Supplementary feeding of grazing stock with agro-industrial by products improves the supplies of fermentable energy and digestible protein which are needed for optimizing the efficiency of rumen functions for efficient utilization of low-quality forages available during the dry season (Olafadehan and Adewumi, 2009). These are high compared to what was reported by (Abbaya *et al.,* 2020) for free grazing Bunaji with 1.92 ± 0.55l and Bokoloji with 1.66 ±0.43l without supplementation.

The current interest in the composition of milk is probably due to its nutritional importance in human diet and owing to the fact that, the composition is not absolute as many factors influence the end products (Roxstrom *et al.,* 2001; Massanyi *et al.,* 2009; Smith *et al.,* 2013). Composition of milk is considerably affected by factors such as breed, species, lactation period and season (Molefe and Mwanza, 2019). In (Table 2), Fat(%) did not vary in all the farms, TS(%) Total solid, TA(%) Titrable acidity, CP(%) Crude protein, Ash(%), SNF(%) Solid non fat differ significantly ($p<0.001$). Tsaunin fulani farm was the best in Fat(%) of 4.26, Asibitin tafasa farm was the lowest of 3.84. The fat contents agreed with the range 3.0-8.2% as reported by (Onatola, 2004). Milk fat performs many definite functions in the human diets. It is a rich source of fat-soluble vitamins, essential fatty acids and other growth-promoting factors. It is believed that ghee improves mental power, physical appearance, and longevity (Wright, 2011). Lautaye was the best in TS(%) 57.2, Dakatsalle was the lowest of 38.8. In TA(%), Imawa arewa was the best of 0.38 and lowest in Dakatsalle, kuki and shinkafi of 0.29. These are higher than 0.18% reported by (Oviri, 2015). Ash(%) was best in Dantube of 0.54 and lowest in Dakatsalle, kuki of 0.32. Imawa arewa, Danbatta and Kwanar dumawa farms are the best in CP(%) 4.24, Dakatsalle was the lowest of 3.52. CP(%) contents agreed with the range 2.9 to 5.0 reported by (O'Mahony, 1988). Lautaye was the best in SNF(%) 52.96, Dakatsalle was the lowest of 34.6.

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Table 2: Milk chemical composition of different dairy cattle farms

	Parameters					
Farms	**FAT(%)**	**TS(%)**	**TA(%)**	**CP(%)**	**ASH(%)**	**SNF(%)**
Imawa arewa	4.06	55^{b}	0.38^{a}	4.24^{a}	0.50^{ab}	50.9^{a}
Tsaunin fulani	4.26	49.2^{b}	0.32^{b}	4.14^{a}	0.52^{c}	44.9^{b}
Danbatta	4.02	39.2^{b}	0.32^{b}	4.24^{a}	0.44^{b}	35.32^{b}
Mariri	3.88	42.4^{b}	0.33^{ab}	4.16^{a}	0.53^{a}	38.38^{b}
Asibitin tafasa	3.84	39.4^{b}	0.34^{ab}	3.94^{a}	0.44^{b}	35.6^{b}
Kwanar dumawa	4.04	41.4^{b}	0.31^{b}	4.24^{a}	0.50^{ab}	37.6^{b}
Dakatsalle	4.14	38.8^{b}	0.29^{c}	3.52^{b}	0.32^{c}	34.6^{b}
Kuki	4.2	53.2^{b}	0.29^{c}	3.46^{b}	0.32^{c}	49.24^{ab}
Shinkafi	3.96	55.2^{ab}	0.29^{c}	3.92^{a}	0.34^{bc}	51.0^{a}
Lautaye	4.24	57.2^{a}	0.30^{bc}	3.86^{ab}	0.34^{bc}	52.96^{a}
Dantube	4.2	45.8^{b}	0.37^{a}	4.08^{a}	0.54^{a}	41.6^{b}
Behun	4.1	39.6^{b}	0.32^{b}	3.96^{a}	0.45^{b}	35.5^{b}
SEM (±)	0.08	4.24	0.01	0.08	0.02	4.00
P-value	0.002NS	0.000***	0.000***	0.000***	0.000***	0.000***

^{a,b,c} means with superscripts differ significantly ***($p<0.001$), NS=Not significant, Fat(%)=Butter fat, TS(%)=Total solid, TA(%)=Titrable acidity, CP(%)=Crude protein, ASH(%)=Ashing, SNF(%)=Solid non fat, SEM=Standard error of means

In (Table 3), Fat(%) differ significantly ($p<0.05$). This finding is similar to that reported by (Hurley, 1997) and (Belewu, 2006) on variation in fat content among cow breeds. The variation in the fat content may be attributed to different genetics and physiological status of the cow breeds (Frank, 1988). It may also be attributed to different herd management by the owners (Zeleke, 2007). According to (Belewu, 2006) variations in fat content among breeds of cow is an inherited character which implies that breeds with higher fat content produce less milk quantity than those with low fat content. TS(%) differ significantly ($p<0.001$) among the breeds while, TA(%), CP(%), Ash(%), SNF(%) did not vary. (Brzoska, 2005; Radkowaska and Herbut, 2014) reported non-significant variation of these parameters in cows under different management systems. Contrary to these findings, significant differences ($p<0.05$) among the Titrated Acid (TA), Total Solid (TS), Total Solid Non-Fat (TSNF) was reported by (Abbaya *et al.*, 2021) in Bunaji and Bokoloji breed. Non significant of Solid-not-fat agreed with the report of (Mooney and Allen, 1997) and (Barje, 2006) when cottonseed cake was offered to Friesian x Bunaji cows. They concluded from their study that effect of breed on milk composition is not significant.

Bunaji was superior in Fat(%) of 4.22, TS(%) 50.2, SNF(%) 45.74 likewise as reported by (Abbaya *et al.*, 2020), the Bunaji was superior in fat yield and TSNF while the Fresian x Bunaji was superior in CP(%) 4.24, which is lower than 5.1- 6.8% reported by (Barje, 2006) when whole cottonseed were fed at varying levels to Friesian x Bunaji heifers. It is lowest in Fat(%) 3.88, Ash(%) 0.44, TS(%) 39.2, SNF(%) 35.32. Bunaji had the highest Total protein (3.89%) as reported by (Abbaya *et al.*, 2021) which is slightly lessthan that of Fresian x Bunaji obtained in this study. Bokoloji was superior in Ash(%) 0.47, lowest in TA(%) 0.31. Titrable acidity is the sum of natural and developed acidity. The normal acidity of individual cow milk ranges from 0.10 to 0.26% lactic acid. Developed acidity which is due to citrates and

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phosphates present in the milk and dissolved carbon dioxide CO_2 during the process of milking. Natural acidity which is due to lactic acid produced by the action of Bacteria on lactose in milk. (Oladapo and Ogunekun, 2015) reported that Bokoloji breed had higher percentage of crude protein (4.10) contrary to these findings Bunaji was superior with 4.1, Bokoloji with 4.02. Some of the Total proteins investigated in this study was above the recommended values 2% to 4% as reported by (Hassan, 2005) and (Kra *et al.*, 2013). Murrah breed was reported to have higher milk protein value (4.92) than Nili-Ravi (4.54) breed of Buffalo in China (Han *et al.*, 2007; Ren *et al.*, 2015). Proteins are required for body building and repairs (Oladapo and Ogunekun, 2015). The Total solid non fat (TSNF) reported by (Abbaya *et al.*, 2021) was 4.06% (White Fulani) and 3.77 (Sokoto Gudali) which is lower than 45.74, 36.46 respectively. Milk with high solids-not-fat is valuable to the consumer for its flavor and nutritional value and to the manufacturer of milk products, especially relating to cheese yield (Roberts, 1987). Fat and Solids-not-fat (SNF) plays an important role in physico-chemical, sensory, textural characteristics and also the shelf life of any milk sweet (Apurva *et al.*, 2013). Solid non fat consist of lactose, casein components. (Abbaya *et al.*, 2021) reported TA(%) of 0.45 ± 0.00, 0.56 ± 0.00 for Bunaji and Bokoloji respectively which is slightly higher than 0.35, 0.31 from these findings. TS(%) of 13.42 ± 0.09, 12.54 ± 0.03 of Bunaji and Bokoloji reported by (Abbaya *et al.*, 2021) is lower to 50.2 and 40.2 of this findings. Fat(%) of 2.98 ± 0.13, 3.18 ± 0.14 of Bunaji and Bokoloji as reported by (Abbaya *et al.*, 2020) is lower than 4.22, 3.92 from this findings. Ash(%) of 0.65±0.06 as reported by (Adesina *et al.*, 2012) for Bunaji is slightly high than 0.45 obtained from this findings with no significant difference among the breeds. Ash Determination of food samples is part of the proximate analysis necessary for nutritional evaluation. This ensures the safety of foods making sure there are no toxic minerals present (Precisa, 2023). Ash consist of inorganic components. The differences observed in the quality characteristics of milk had been associated with stage of lactation, (Ozrenk and Selculk, 2008), lactation length and lactation yield (Neitz and Robertson, 1991). The knowledge of relationship amongst these traits can help in the formulation of programmes for selection and improvement of milk quality (Alade *et al.*, 1999; Alphonsus and Essien, 2012).

Table 3: Effects of dairy cattle breeds on average milk chemical compositions and ADMY(l)

	Parameters						
Breeds	**FAT(%)**	**TS(%)**	**TA(%)**	**CP(%)**	**ASH(%)**	**SNF(%)**	**ADMY**
Bunaji	4.22[a]	50.2[a]	0.35	4.1	0.45	45.74	2.74
Bokoloji	3.94[ab]	40.4[ab]	0.31	4.02	0.47	36.46	2.67
Fresian Bunaji	x3.88[b]	39.2[b]	0.32	4.24	0.44	35.32	4.01
SEM(±)	0.072	1.72	0.02	0.082	0.06	1.76	0.25
P-value	0.013*	0.001***	0.44NS	0.198NS	0.693NS	0.002NS	0.004NS

[a,b] means with superscripts differ significantly, *(p<0.05), ***(p<0.001), NS=Not significant, Fat(%)=Butter fat, TS(%)=Total solid, TA(%)=Titrable acidity, CP(%)=Crude protein, ASH(%)=Ashing, SNF(%)=Solid non fat, SEM=Standard error of means ADMY=Average daily milk yield.

CONCLUSION AND RECOMMENDATIONS

Dairy cattle farmers in the study areas mostly kept dairy cattle breeds under semi-intensive and intensive system of management. Indigenous cattle breeds produce less quantities of milk than crosses however, relatively large quantity of local dairy breeds are contributing bulk amount of milk in the state. Milk yield and composition varied between the dairy breeds, herds of the same breed and even between individual cows of a breed. Therefore, Danbatta

farm, Fresian x Bunaji with the best milk yield, Tsaunin fulani farm with the best Fat(%), Lautaye farm TS(%), Imawa arewa TA(%), Imawa arewa, Danbatta and Kwanar dumawa farms CP(%), Dantube farm Ash(%), Lautaye farm SNF(%), Bunaji breed with the best Fat(%), TS(%), TA(%), SNF(%), Bokoloji breed Ash(%), Fresian x Bunaji CP(%) was recommended.

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