EFFECT OF BREED ON BODY WEIGHT AND MILK QUALITIES OF SOKOTO GUDALI AND WHITE FULANI COWS IN NIGERIA

***Ugbojah, G. O.[2], Abisoye, F. O.[1], Iyiola-Tunji, A. O.[2] and Barije P.P.[2]**
[1]Department of Animal Health and Production Technology, School of Agriculture, Kogi State Polytechnic, Itakpe, Kogi State
[2]Department of Animal Science Ahmadu Bello university, Zaria, Kaduna State, Nigeria.
Corresponding author: faith.abisoye@gmail.com; 08065333496

ABSTRACT
This study aimed at determining the genetic variations in body weight, milk composition as well as milk efficiency traits of Sokoto Gudali (SG) and White Fulani (WF) cows in National Animal Production Research Institute (NAPRI) Shika, Zaria. Body weight, total milk yield, lactation length, average daily milk yield and other milk composition were analyzed using students t-test and the means was expressed as mean± standard error (SE). The highest dry matter (11.00%), oil (6.95%) and ash (6.95%) of the raw cow milk were observed in Sokoto Gudali. Crude protein and nitrogen free extract was highest in the milk of White Fulani cows. Total milk yield, bodyweight, lactation length and ash contents of the raw milk differs significantly ($p<0.05$) between the breeds while all the other traits (calcium, phosphorus, lactose, fat, protein, pH, ADY, fat corrected milk yield kilogram metabolic weight, and fat corrected milk yield per day per kilogram metabolic weight, net energy efficiency and dairy merit) were statistically similar. In conclusion, there exist a considerable genetic variation between White Fulani and Sokoto Gudali for milk yield, milk composition and efficiency traits.
Keywords: Parity, Milk, Proximate composition, Sokoto Gudali, White Fulani.

INTRODUCTION

Milk is produced by the mammary glands of mammals. It is the primary source of nutrition for infant mammals (include humans who breastfeed their young ones) before they are able to digest other types of feeds. Early lactation milk contains colostrum, which carries the dam's antibodies to its young and can reduce the risk of many diseases (FAO, 2022). Milk is an important source of minerals especially calcium, phosphorous, sodium, potassium, iodine, magnesium and small amounts of iron. Calcium and phosphorus constitute a large fraction of the minerals which is needed for bone growth and proper development of newborns (Al-Wabel, 2008).

As an agricultural product, milk is extracted from goats, buffalos and cows after parturition.
Dairy farms produced about 730 million tons of milk in 2011 (FOGMA, 2012), from 260 million dairy cows (WDCN, 2014). India is the world's largest producer of milk, and is the leading exporter of skimmed milk powder, yet it exports few other milk products (GSI, 2014). The phenotypic expression of milk production traits (for examples, milk yield and composition) are controlled by genes, which may or may not be transferred to the offspring (Wang *et al.,* 2022). The genetic value of a trait indicates the likelihood that the genes responsible for that trait will be transferred to offspring. Consequently, when dairy producers are selecting animals for breeding. they are typically more concerned with an animal's genetic value rather than the phenotypic value of the particular trait (Haskell *et al*., 2014). The difference is that while the phenotypic value refers to the presence or absence of particular traits, the genetic value indicates the potential or probability that this animal, if bred, can transfer its genetic worth to the offspring. The challenges of the dairy breeders are to determine which cows to breed in order to obtain progeny with high milk production traits, as well as any other desirable attributes (Goddard *et al.,* 2009).

MATERIALS AND METHODS

The study was conducted at the Dairy cattle breeding unit of National Animal Production Research Institute (NAPRI), Shika. The totalnumber of the experimental animals was twenty-four (24) lactating cows, twelve (12) per breed. Two different breeds of cows were used for the experiment which includes Sokoto Gudali (SG) and White Fulani (WF). The animals grazed on mixed pasture under the close supervision of herdsmen for about seven to eight hours daily.

Milk was collected at 5, 20, 35, 50 and 65 days post-partum for both Sokoto Gudali and White Fulani breeds, respectively. Milk collection was done early in the morning before feeding the cows. Milking was done through manual procedure (hand milking). Ten (10) mls of raw milk were collected from the udder of the cows into individual graduated containers. Collected milk samples were transported immediately to the laboratories for analysis at the Department of Animal Science laboratory, Ahmadu Bello University, Zaria for the proximate analysis of the milk while calcium, Phosphorus, Lactose, Fat, Protein and pH were analyzed in Chemical Pathology laboratory of Ahmadu Bello University Teaching Hospital, Zaria. The proximate compositions of the samples were analyzed according to the recommended methods of A.O.A.C (2005). These proximate constituents include Fat, Crude protein, Phosphorus and Calcium

Statistical Analysis

Data generated on variables from milk (calcium, phosphorus, lactose, total fat, total protein and pH) and serum (calcium and phosphorus) were analyzed using students t-test and the means was expressed as mean± standard error (SE). The analysis was carried out at 5% probability

RESULTS AND DISCUSSION

Table 1 shows the effect of breeds on proximate composition of milk of the cattle breeds studied. Breeds had significant ($p<0.05$) effect on ash content of the milk, while other traits such as dry matter, crude-protein, oil and nitrogen free extract indicated non-significant ($p>0.05$) variations due to breeds. The highest dry matter (11.00%), oil (6.95%) and ash (6.95%) were observed in Sokoto Gudali. The observed similarity in the dry matter, crude protein, oil and nitrogen free extract in the milk of White Fulani (WF) and Sokoto Gudali (SG) cows populations suggest a low genetic diversity and structures of the two most common Nigeria cattle population (Norezzine *et al.*, 2019).

Table 1: Effect of breeds on proximate composition of milk

Parameters (%)	White Fulani	Sokoto Gudali	P Value
Dry matter	10.61±0.92	11.00±0.67	0.06
Crude protein	8.83±0.46	7.20±0.45	0.21
Oil	6.37±0.85	6.95±0.82	0.17
Ash	4.83±0.38[b]	6.95±0.61[a]	0.02
NFE	79.97±12.85	78.91±14.82	0.09

[ab]Means with different superscript across rows differ significantly ($p<0.05$); NFE-Nitrogen free extract

Table 2 shows the breed effect on milk quality, bodyweight and milk efficiency traits. Total milk yield, bodyweight and lactation length differs significantly ($p<0.05$) between the breeds while composition of calcium, phosphorus, lactose, fat, protein, pH, ADY, FCM/kgw, FCM/day/w, NEE and dairy merit were statistically not different.

Table 2: Effect of breed on milk quality, bodyweight and milk efficiency traits

Parameters	White Fulani	Sokoto Gudali	P Value
Total milk yield (kg)	865.42[a]	798.92[b]	0.02
Calcium (mmol/L)	2.40	2.54	0.09
Phosphorus (mmol/L)	8.54	9.19	0.06
Lactose (mmol/L)	11.94	11.63	0.11
Fat (g/L)	4.83	4.45	0.59
Protein (g/L)	2.96	2.97	0.09
pH	6.60	6.60	0.31
Bodyweight (kg)	362.33[b]	384.50[a]	0.01
Lactation length (days)	277.58[a]	243.75[b]	0.02
ADY (kg)	3.13	3.33	0.17
FCM/kgw	8.50	8.00	0.08
FCM /day/kgw	0.023	0.02	0.13
NEE (%)	59.13	61.78	0.09
Dairy merit (%)	73.50	76.81	0.59

[ab]Means with different superscript across rows differ significantly ($p<0.05$); ADY-average daily gain, NEE-Net energy efficiency; FCM/Kgw =fat corrected per milk yield kilogram metabolic weight; FCM/day/kgw, fat corrected milk yield per day per kilogram metabolic weight

Total milk yield (865.42kg) and lactation length (277.58 LL) was significantly ($p<0.05$) higher in White Fulani cow milk. Sokoto Gudali (SG) cow had significantly ($p<0.05$) heavier bodyweight compare to White Fulani (WF) cattle. Calcium, phosphorus, protein, ADY and NEE had higher activity in Sokoto Gudali than the White Fulani cattle.The observed bodyweight superiority of the Sokoto Gudali over the White Fulani looks plausible because of their distinctive white coat color, which can make them appear more visually appealing. Breeds relationships and size can be determined through comparative measures of morphometric features (Park *et al*., 2015). The significant difference in body weight between the two cow breeds could be linked to the particular breed's potential and characteristics.

CONCLUSION AND RECOMMENDATION

Considerable genetic variation exists in milk quality and bodyweight (362.33 vs 385.50 kg) in White Fulani and Sokoto Gudali cows thus suggest that there was a positive correlation between body weight and milk quality in both breeds, which indicate that heavier animals produced higher quality milk. White Fulani cows are thereby recommended as a breed of choice for crossbreeding with temperate cattle to boost milk production and adaptability in tropical conditions of Nigeria.

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