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Milk Characterization between White Fulani and Sokoto Gudali Cattle Breeds in Nigeria

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ABSTRACT: The objective of the study was to compare the components of milk from both the white Fulani and the sokotogudali cattle. A total number of seventy-six (76) cattle including thirty-five (35) SokotoGudali and forty-one (41) White Fulani were used for the experiment. 5ml of milk samples were collected from each cow at morning milking. Milk protein, fat and whey content are removed by centrifugation, heating and addition of acetic acid. Result ranged from whey, protein and fat85.85 – 76.51%, 13.14-8.92%, and 12.20-5.14% respectively with sokotogudali having significant ($p<0.05$)highest content of fat and casein and a significant ($p<0.05$) higher whey contents in white fulani cattle. Therefore, based on standard requirements, the proximate content of studied white fulani is within the range for milk composition and recommended for human consumption while that of Sokotogudali is above the range and may therefore be raised for cheese production.

Keywords: breeds, cattle, milk, characterization, Nigeria

I. INTRODUCTION

Globally, there has been an increased awareness of the importance of indigenous animal breeds and the need to properly utilize and manage these resources. Milk and its individual compounds are of major importance in relation to human nutrition universally. Milk is highly valued since it is a source of many essential nutrients which help in the development and maintenance of the human body. Itcontainswater, protein, fats, carbohydrates,cholesterol, minerals, vitamins and energy which makes it have an exceptional nutrient profile.

Cattle are raised for purposely for their, and also prominently known for their position in our meat supply and livestock industry.

[1]. These can be attributed to their capacity for milk production which is much more than that required by its offspring and a high nutritive value of the milk such that it may be used to cater our daily nutritional requirement. White Fulani is the most widespread of all Nigerian cattle breeds.They are found from Lagos to Sokoto, Katsina and Kano States and spread across the Nigerian Middle Belt.

[2]. They are resistant to diseases with the ability to thrive under a variety of conditions, the main limiting factors of this tropical breed of cattle include late sexual maturity, long interval between calving and short lactation length.

[3]. They are also important for their genetic predisposition of hardiness, heat tolerance and adaptation to local conditions, it is a triple-purpose animal, with an average milk production of 2,300 kg per lactation.

Gudali is a Hausa that represent "short-horned and short-legged animals. SokotoGudali (Bokoluji) cattle possesses multiple coat colours and are known for milk quality, the udders in the female are well developed with good teats, hence they are regarded as indigenous dairy breed producing an average of1,500 kg of milk per lactation. They possess short hair, thick skin which is also pigmented with pendulous ears. They are also known to be slow and sluggish in nature.

Although, there are many sources of animal protein in Nigeria, several studies have shown that cattle and their products are the predominant and the most commonly consumed animal protein sources. Thus, cattle are a highly valued livestock in Nigeria.

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II. OBJECTIVE OF THE STUDY

The objective of the study was to characterize milk properties between White Fulani and SokotoGudali (bukoloji)and for proper selection of breeds for the right purpose.

III. MATERIALS AND METHODS

Samples

The animals used in this study were collected from Ikere, and Iseyin region of Ondo and Oyo state, Nigeria. A total of seventy-six (76) cattle includingthirty-five (35)SokotoGudali and forty-one (41)White Fulaniwere used for the experiment.5ml of milk samples were collected from each cow at morning milking and transported in cold chain to the central laboratory of Federal University of Technology, Akure (FUTA) for further analysis.

Milk Component Separation

Milk protein, fat and whey content were manually separated according [5] to with some modifications

The analysis is briefly described as follows:

Milk Fat analysis

It was extracted from the collected sample by centrifuging at 5000g for 15minutes, and later placed in a hot sandbath already heated to 105°F under close monitoring using a thermometer, to separate into different components. A spatula was used to remove the precipitated fat content. This was collected into an eppendorf tube and measured on a sensitive scale to get the weight of the fat inside the milk.

Milk protein (casein) analysis

100ml vinegar was added to the milk sample already placed inside a heating water bath, the mixture was been stirred gently and vinegar is been added continuously, until the casein begins to precipitate from the liquid in small blubs of white solid matter.Precipitated casein (milk protein) was pressed to the side of the glass, thereby allowing the liquid to drain to the side of the container. The casein (milk protein) was collected into an empty eppendorf tube using a spatula until no more casein is formed and then weighed.

Milk whey analysis

The rest of the liquid remaining after casein (milk protein) and fat has been removed is the whey. It was collected into another eppendorf tube and measured on a sensitive scale to get the accurate weight.

IV. RESULTS AND DISCUSSION

Table1. Effect of breed on milk components of White Fulani and SokotoGudali cattle.

Milk contents	Sokoto Gudali	White Fulani
Casein	13.142 ± 0.57^{b1}	8.926 ± 0.45^{b2}
Fat	12.200 ± 0.56^{c1}	5.146 ± 0.251^{c2}
Whey	76.514 ± 0.80^{a2}	85.853 ± 0.48^{a1}

Superscripts ^{a,b},represents significant difference ($P<0.05$) between breeds component and superscript ^{1,2} represents significant difference ($P<0.05$) across the breeds.

In table 1 above, the whey content of white Fulani (85.85 ± 0.48^{a}) is seen to be highest between the milk components, followed by the casein (8.92 ± 0.45^{b}) and the fat content (5.14 ± 0.25^{c}) of white Fulani.

Also, in sokotogudali the fat content is having the least figure (12.2 ± 0.56^{c}) and the highest is the whey content (76.51 ± 0.80^{a}) this is however in conformity with the standard average composition of cow's milk which stated that moisture content of a cow's milk is 87.75%. Although there are variability in the milk components between and across the breeds and this may be because different breeds produce milk depending on the nutritional need of the new born and the nutritional status of the dam.

Whey/ Moisture Content

The levelof moisture content of the raw milk sample in the cow breeds were in the range of (85.85 – 76.51%) The lowest value was recorded in Sokotogudali(76.51±0.80%) and the [6] who made it known that variation in moisture content in raw milk among the breeds may be due to the difference in composition of the milk of individual breeds. Moisture contents of cow breeds observed in the present study met the milk composition standard requirement of 84.00 – 88.00%.

Protein Content

Protein content was significantly ($p<0.05$) affected by cow breeds and was highest in

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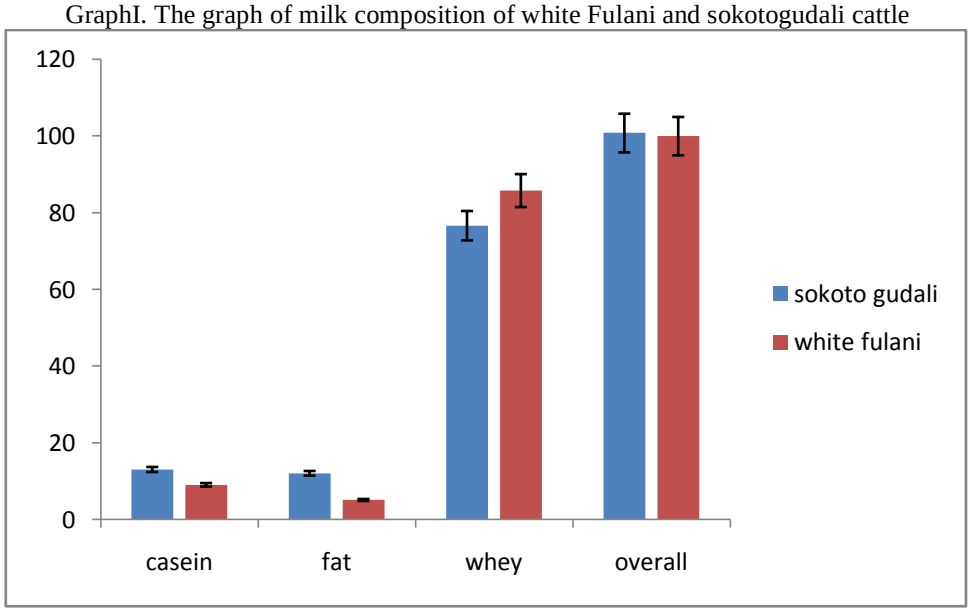
(13.142±0.57)Sokotogudali. These is in line with the work of [7] who found significant difference in protein content among Bunaji and Bokoloji cow breeds. The protein content of cow breed in the present study was higher than 3.30±0.22% of the findings of[8] for Bunaji and Bokoloji cow breeds, which may be as a result of environment, system of management, and period of study. The result of protein content across the breeds in the present study was significantly ($p<0.05$) in sokotogudali cattle, the difference in protein content within and across the breeds could be due to breed differences as well as the metabolic activities of bacteria present in the milk. [9]. Protein content of cow breeds in the present study is higher than 3.56% of the milk composition standard requirement.

Fat Content

Fat content in the cow breeds ranges from 12.20 –5.14% which was significantly highest ($p<0.05$) in sokotogudali (12.20±0.56) and lowest in White Fulani (5.14±0.25). Milk fat varied extensively among the breeds, this finding is similar to what was reported by [10] 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. [11] It may also be due todifferent herd management by the owners (pastoralists). [12] According to 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.

However, Fat content of cow breeds in the present study was greater than the earlier findings from previous authors, it was that reported fat content of 4.30, 3.79 and 3.86% respectively for cow milk produced in dairy farms [13].

GraphI. The graph of milk composition of white Fulani and sokotogudali cattle



According to [14] Protein is required for body building and repair, while fat is known as a source of energy too much fat could constitute to health risk. The proportion of both fat and protein in milk are determined majorly by the genetic make-up of the lactating animals though they can be changed by nutrition and methods that adjust digestive and metabolic process. Therefore the fat contents in white Fulani cattle is within the range of fat for milk composition standard requirement of (3.50 – 5.00%).

V. CONCLUSION

The results of this study demonstrated that raw milk from Sokotogudali has higher protein and fat but lower whey/moisture content compared to other breed and higher than the milk composition standard requirement. While white Fulani has a lower protein and fat but higher whey content which fall in line with the composition standard requirement. In general breedsof cow had significant effect on the fat and water compositions with milk fat varying extensively and the whey and casein compositions were affected by breed differences too.

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