MICROBIAL ANALYSIS OF CHEESE SAMPLES OBTAINED FROM HOLSTEIN FRIESIAN AND BUNAJI (WHITE FULANI) COWS UNDER TWO DIFFERENT MANAGEMENT SYSTEMS

ALEMEDE, I. C., SADIQ, H., OLATUNJI, E. A. and ADAMA J. Y.
Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria

Abstract

Microbiological analysis of fresh cheese samples produced from the milk of nine (9) Holstein-Friesian and three (3) Bunaji cows under four different treatments (T_1 - T_4) was carried out at Maizube Farms, Minna in Niger State. Treatment 1 (T_1) comprised of indigenous Bunaji (White Fulani) breed while treatment 2 to 4 (T_2 - T_4) comprised of high, medium and low producing exotic Holstein-Friesian breed, respectively. There were three replicates in each treatment.

Microbiological analysis reveals no growth of bacteria and fungi on cheese samples obtained from the Bunaji breed as opposed to the temperate Holstein-Friesian breed. It is concluded that cheese from Bunaji cow milk had better keeping quality.

Keywords: Cheese, Microbiological analysis, *Bunaji* and Holstein-Friesian.

INTRODUCTION

The high price of imported milk products seem to have made consumers more ready to accept locally produced ones .Consumers now clearly demonstrate their acceptance for locally processed milk (FAO, 1990; Aduku and Olukosi, 1991). Therefore, there is need to increase the level of milk production with acceptable quality in Nigeria by exploring the possibility of increasing the production,

utilization and better handling of milk and milk products. Some of these possibilities lie in the development of exotic breeds, which have better milk yield and devising methods of extending the keeping quality of milk and the product thereof. Consequently, the objective of this study is to produce cheese from milk of *Bunaji* and Holstein - Friesian cows and compare the keeping quality of these products.

MATERIALS AND METHOD

The experiment was conducted at Maizube Farm, Sabon dagah, Minna in Nigeria. Twelve animals were used for the experiment, Nine (9) were exotic Holstein Friesian cows while three (3) were White Fulani (*Bunaji*) cows. The management systems were purely intensive for the Holstein -Friesian breed and semi-intensive (natural grazing and feed supplements) for the White Fulani *(Bunaji)* breed. T_1 represented the *Bunaji* breed kept under semi-intensive management while T_2, T_3 and T_4 were high, medium and low producing Holstein - Friesian breed. They were routinely vaccinated against diseases, regularly sprayed against ecto-parasites and dewormed. Artificial Insemination (AI) on the animals was duly practiced.

Cheese were produced from the milk obtained from both breeds of cattle in the first week of study and were distributed into four (4) treatments: T_1, T_2, T_3, T_4 in four (4) plastic cups. The samples after production were kept on the table in the laboratory and covered under ambient temperature for three days and later refrigerated at 0°C for six weeks. Samples were aseptically taken from each treatment at the middle of every week for microbial analysis for six weeks.

Total bacteria and fungal counts were carried out by making serial dilution of the samples in sterile water. 1g (cheese) of the serial diluents was placed on Nutrient Agar (NA) for bacteria count, Sabouraud Dextrose Agar (SDA) for fungi or yeast load and Eosine Methylene Blue Agar (EMB) for coliform count using pour plate technique as described by Atlas *et al* (1988) and Fawale and Oso (1995). All data obtained were pooled and subjected to one-way analysis of variance (ANOVA) and test of significant difference using statistical package (SPSS), version 10 for windows 2002.

RESULTS AND DISCUSSION

Microbial and fungal counts of cheese samples: The analysis indicate that *(Bunaji)* had the least bacteria and fungal count of 0.00 (Table 1) which gave better keeping quality and longer shelf life. The highest contamination was obser

aureus and Bacillus subtilis. They occurred in all the treatments (T_2, T_3 and T_4) samples while the control (T_1) had none (Table 3). The bacterial isolates listed in this study are suspected to contaminate the samples from various sources which include poor handling and storage after collection of milk (Frazier and Westhoft, 1988, Adesiyun (1995) but most importantly, the none presence of any contaminants in the T_1 samples is directly related to the type of nutrition given to the Bunaji cows.

Table 2: Identification features of fungi (yeast species) on cheese samples

Sample	Macroculture (Colonial appearance)	Hypae	Spore	Organism
T_1	NIL	NIL	NIL	NIL
T_2	Initially flat to raised colonies. Initial colour is grey yellow as it is aging in more than 24 hours incubation the colour becomes only pure grey colour	Septate	No spore	*Candida tropicalis*
T_3	The colony is semi glossy initially and as it ages, it changes to smooth rippled. Initial colour is grey after 24hours it changes to white.	Non-septate (No hypae)	Spore	*Candida torulopsis*
T_4	The colonies are demarcated and are round, smooth in shape. The colour is cream throughout	Non-septate (No hypae	Spore	*Torulopsis dattila*

NIL = No growth

CONCLUSION AND RECOMMENDATION

It was concluded that cheese samples obtained from *Bunaji* cows had no microbial count, longer shelf life and better quality. High sanitary practices during collection, processing and storage of cheese is recommended especially with the semi-intensive system to prevent contamination and infection. Also, good medical attention should be given to all animals to prevent transmission of harmful disease causing organisms.

Table 3: Characterization and Identification of Bacteria Isolated from Cheese Produced from Bunaji Cow's Milk and Holstein-Friesian Cows

Sample	Gram Reaction	Catalase Test	Coagulase Test	Starch Hydrolysis Test	Hydrogen Sulphide	Methyl red test	Voges Proskaucer test	Oxidase Test	Motility Test	Indole test	Carbohydrate Utilization					
											Sucrose	Fructose	Mannitol	Lactose	Glucose	Organism
T_1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
T_2	+C	+	+	-	-	-	-	-	-	-	+	+	+	-	+	*Staphylococcus aureus*
	+R	-	-	+	-	-	+	-	+	-	+	+	-	-	+	*Bacillus subtilis*
T_3	+C	+	+	-	-	-	-	-	-	-	+	+	+	-	+	*Staphylococcus aureus*
	+R	+	-	+	-	-	+	-	+	-	+	+	-	-	+	*Bacillus subtilis*
T_4	+C	+	+	-	-	-	-	-	-	-	+	+	+	-	+	*Staphyloccoccus aureus*
	+R	+	-	+	-	-	+	-	+	-	+	+	-	-	+	*Bacillus subtilis*

+R = Positive rod *-R = Negative rod* *+C = Positive cocci* *+ = Positive result* *- = Negative result*

REFERENCES

Abdulrahman, Y. O (2004). Biochemical and microbiological assessment of milk from Holstein Friesian cows fed varied levels of dietary energy and protein at Maizube Farms, Minna, Niger State. Unpublished B.Sc project, Federal University of Technology, Minna.

Adesiyun, A. A (1995). Prevalence and characteristics of Staphylococci from fine ready to eat products in Nigeria. *Nigeria Journal of Science*. 2: 135-139.

Aduku, O. A and Olukosi, J. O. (1991). Animal products processing and handling in the tropics. Living Books Series G. U. Publication, Abuja. Nigeria.

Atlas, R. M., Brown, A. E., Dubra, K.W and Miller, L (1988). *Experimental Microbiology, Fundamentals and Applications*. 2nd Edition. Macmillan Publishers, New York.

FAO (1990). Food and Agricultural Organization. The technology of traditional milk products in developing countries. Annual production and health paper. 85: 263-271 Rome.

Fawale, M. A and Oso, B.A (1995). *Laboratory Manual of Microbiology*. University press, Ibadan.

Frazier, W. C and Westhoft, D.T (1988). *Food Microbiology*. 4th Edition. McGraw Hill Book Company, Singapore.

Radostits, O. M., Blood, D. C and Gay, C. C (1994). *Veterinary Medicine. A textbook of the diseases of Cattle, Sheep, Pigs, Goats and Horses*. 8th Edition, Sanders Company Ltd, London. 1163-1164.