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SENSORY CHARACTERISTICS OF WHITE SOFT CHEESE MADE FROM SUNFLOWER (*HELIANTHUS ANNUUS*) SEEDS' ENZYME WITH DIFFERENT MILK SOURCE

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ABSTRACT

The study was conducted in the milk processing unit at College of Animal Production Science and Technology, Sudan University of Science and Technology, during January to September 2014, to examine the effect of coagulant, using the partially purified enzyme from sunflower (*Helianthus annuus*) seeds compared with rennet and milk source (cows' and goats') on sensory characteristics of white soft cheese. Twenty five liters of fresh cow's full cream milk were purchased from the farm of College of Animal Production Science and Technology, Sudan University of Science and Technology, and (25) liters of goats' milk was purchased from a private farm at Khartoum North. Four treatments were carried out for cheese processing as follows: First treatment, in which cheese made with cows' milk and rennet enzyme. In the second one, cheese made with cow's milk using sunflower enzyme. Third treatment, cheese with goats' milk had rennet enzyme and the fourth one, cheese with goats' milk had sunflower enzyme. After milk pasteurization, 0.02% $CaCl_2$ and 2% starter culture were added then white cheese was made and stored at 4°C and sensory evaluation was done for the cheese samples. The cheese statistical analysis showed that milk source significantly ($p<0.01$) affected the sensory characteristics of the cheese except texture did not show significant ($p>0.05$) variation, whereas coagulant type revealed a significant difference ($p<0.01$) in the sensory characteristics of the manufactured cheese.

KEYWORDS: *Helianthus annuus* seeds' enzyme; milk type; white soft cheese; sensory characteristics.

INTRODUCTION

[1].Cheese is a product that made from the curd obtained from milk by coagulating the casein with the help of rennet or similar enzymes in the presence of lactic acid microorganism(1). Cheese defined as cheese defined as the fresh or ripened product obtained after coagulation and whey separation of milk, cream or partly skimmed milk, buttermilk or a mixture of these products, it can also be made from the milk of cows, sheep, goats and camels or mixture of two of these.[1]

Each type of milk imparts the characteristics quality of cheese made from it and the resulting cheese will diver in its proprieties, such as body, texture, and flavor.[4] White cheese is the most type of cheese available to the public at large quantities on the markets of Sudan, the method of its making were introduced from Egypt, or through Egypt, from Mediterranean countries such as Syria or Greece.[5] It is locally known in Sudan as (Gibna Bayda) or *Gibbna* which is the most famous name, and it is usually stored in containers filled with whey.[6] Natural cheese should be stored at suitable temperatures to ensure good quality because a high temperature leads to evaporation of moisture and growth of unwanted bacteria and other faults.[1]

Rennet coagulated cheese represent the major type (~75%) and calf rennet has been and still the most widely used milk-clotting enzyme preparation in cheese making industry, [7] This combined with the elevated price of calf rennet and reduced quantity of natural calf rennet.[8] Together with that, the use of animal rennet is restricted for religious (e.g., Judaism and Islam), safety (bovine spongiform encephalopathy), and diet (vegetarianism) reasons, or being against genetically engineered foods.[9] All the above reasons have demanded the search for a new enzyme with a high ratio of milk-clotting/ proteolytic activity and low preparation cost to be used as a rennet substitute and/or additive.[10] Consequently, much research interest has been focused on the discovering milk-clotting enzymes from other sources, and as a result, several enzyme preparations of animal, microbial, and plant origin have been discovered.[11] However, most of the enzyme preparations from the above sources were found unsuitable because they

produced cheese with low yield and bitter taste due to the low ratio of milk-clotting/ proteolytic activities.[12]

Sunflower (*Helianthus annuus*) is widely distributed in the Sudan, and its seeds are edible and are used for extraction of cooking oil. Previously, the seeds of sunflower were used for the isolation of aspartic protease.[13] In addition,[14] studied the milk-clotting ability of ammonium sulfate precipitated extract of sunflower seeds and investigated its mode of action on different caseins.[15] concluded the partially purified sunflower enzyme has higher milk-clotting activity and lower proteolytic activity. Also showed both milk sources and enzyme types significantly affected the cheese yield and curd formation time where the cheese made from cow milk using sunflower enzyme had higher yield compared to that obtained using commercial rennet, whereas the opposite was observed when using goat milk.

All the above reasons have demanded the search for evaluation of the quality of cheese processing using the plant enzymes with different milk types still scarce and needs more investigation. Therefore, the main aim of this study was to evaluate the sensory characteristics of cheese using the partially purified sunflower enzyme compared with rennet, using cows' and goats' milks.

MATERIALA AND METHODS

Materials

Fresh whole cow milk (25 liters) was brought from College of Animal Production Science and Technology farm, Sudan University of Science and Technology, while fresh *Saanen* goats' milk (25 liters) was brought from a private farm at Hillat Kuku, Khartoum, Sudan. Both milks was filtered and divided into 2 equal volumes of (12.5 liters) each and kept at 4°C. Clean and fine sodium chloride was purchased from local market. Rennet powder was obtained from Chr. Hansen's lab, Denmark and the partially purified sunflower (*Helianthus annuus*) seeds enzyme were prepared in lab, freeze-dried at -50°C and stored at -20°C until used for cheese making.

Cheese making

The cheese was produced according to the following procedure of[16-17] with slight modifications. Briefly, 25 liters of fresh cows' and goats' milk were heated at 72°C for 15 second and then cooled to 45°C and $CaCl_2$ was added at the rate of 0.02%. Then, starter culture of lactic acid (*Lactobacillus bulgaricus* and *Lactobacillus thermophilus*) were added at the rate of 2.0% and left for 30 minutes to develop acidity. Rennet tablets (one tablet / 45kg milk) for control ones and the partially purified freeze-dried enzymes of the sunflower seeds were added to the milk at the rate of 2gm/50 liter of milk. The milk were mixed and left until coagulation completed. After coagulation the curd was cut vertically and horizontally into 5 cm^3 with a sharp knife accompanied by addition of 3 % NaCl for each treatment. The whey obtained from the cheese curd was drained and the curd was poured into small wooden boxes lined with cloth and pressed overnight. The curd was removed from the wooden boxes and cut into cubes of 10×5×5 cm^3 and 100 grams of each cheese sample were placed in plastic containers (of 250gm capacity), sealed and stored at 4°C.

Sensory evaluation

The quality of cheese samples stored in refrigerator were judged by 10 untrained panelists for colour, flavor, texture and saltiness using sensory evaluation sheet as describes by [18]

Statistical analysis:

Statistical analysis programme (SPSS) Social Package for Statistical Science (version. 17) was used. General Linear Model was used to determine the effect of coagulants type and milk source on the organoleptic assessment of white cheese. Least significant difference was used for the mean separation between the treatments.

RESULTS AND DISCUSSION

Effect of milk source on sensory characteristics of white soft cheese

The colour and flavor of the white cheese was significantly ($P<0.01$) affected by milk source. Moreover, saltiness of the cheese was significantly ($P<0.05$) affected by milk source while milk source was not significantly ($P>0.05$) affected the texture of white cheese (table 1). Our results were in harmony with[19] they stated that the best cheese was obtained from cows' milk, followed by goats' milk and mixed one; and with the findings of[20] concluded cows' and goats' milks had significant differences in sensory characteristics of Coalho cheese. The variation of colour and flavor of cheese may be attributed to the variation of fat of milk [21]

Table 1 Effect of milk source on sensory characteristics of white soft cheese

Sensory characteristics	Milk source		L.S
	CowM±SD	GoatM±SD	
Colour	6.55 ± 1.07^{a}	6.05 ± 1.63^{b}	**
Flavor	6.34 ± 2.09^{a}	5.57 ± 2.32^{b}	**
Texture	6.67 ± 1.75^{a}	6.60 ± 1.98^{b}	N.S
Saltiness	4.71 ± 1.76^{b}	5.13 ± 1.93^{a}	*

Mean values bearing different superscripts within rows are significantly different ($p \leq 0.05$).
N.S: Not significant

Effect of coagulant type on sensory characteristics of white cheese

All sensory characteristics of white soft cheese demonstrated high significant (P<0.01) differences in cheese made with the partial purified *Helianthus annuus* enzyme compared to rennet one, (table 2). The results were in agreement with those of[22] in colour, flavor, texture and saltiness using *Solanum dubium* extract and rennet. On the other side results were disagreement with those of [23] who reported no significant differences in sensory characteristics between the two types of cheeses using the enzymatic extract from safflower seeds and rennet, and this may be attributed to the fact that plant proteases were considered too proteolytic, leading to bitter flavor and texture defect,[24]

Table 2 Effect of coagulant type on sensory characteristics of white soft cheese:

Sensory characteristics	Coagulant type		Level of significant
	Rennet M±SD	*Helianthus annuus* M±SD	
Colour	5.94 ± 1.60^{b}	6.66 ± 1.04^{a}	**
Flavor	4.93 ± 2.08^{b}	6.98 ± 1.91^{a}	**
Texture	5.38 ± 1.49^{b}	7.89 ± 1.26^{a}	**
Saltiness	3.88 ± 1.64^{b}	5.96 ± 1.45^{a}	**

Mean values bearing different superscripts within rows are significantly different ($p \leq 0.05$).

Effect of interaction between milk source and coagulant type on Sensory characteristics of white soft cheese

Milk source and coagulant type was not showed a significant (P>0.05) effect on sensory characteristics of white cheese, although the partial purified *H. annuus* enzyme showed higher results compared to rennet enzyme (table 3).

Table 3 Effect of interaction between milk source and coagulant type on sensory characteristics of white soft cheese:

Sensory characteristics	Milk source				S.E	L.S
	Cow		Goat			
	Coagulant type		Coagulant type			
	Rennet	*H. annuus*	Rennet	*H. annuus*		
Colour	6.31	6.80	5.58	6.52	0.13	N.S
Flavor	5.49	7.20	4.38	6.76	0.19	N.S
Texture	5.52	7.82	5.24	7.96	0.14	N.S
Saltiness	3.78	5.64	3.98	6.28	0.15	N.S

S.E: Standard error L.S: Level of significance for interaction N.S: Not significant *H. annuus*: *Helianthus annuus*

CONCLUSION

The study concluded that coagulant type and milk source had significant effect on the sensory attributes of the white cheese mainly the colour and flavour of the cheese, however, the coagulant type had not affect the texture of the cheese.

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REFERENCES

1. Ramakant S. Production, Processing and Quality of Milk and Milk Products. International Book Distributing Co. Publishing Division, 2006.
2. Fox P F, Guinee T P, Cogan T M and Mc Sweeney P L H.Fundamentals of Cheese Science. Aspen Publishers, Inc. Gaithersburg, Maryland, 2000.
3. Herrington BL. Milk and Milk Processing. Published by Green world Publisher. New Delhi India, 2000.
4. Andrew W K B. Milk and Milk Products. Published by Updesh Purohit Agrobis, India, 2010.
5. Dirar HA. The indigenous Fermented Foods of the Sudan .A study in Africa food and and nutrition, Chapter 6: Dairy products. CAB. International,1993: 303-344.
6. Kur L L A. Effect of storage on the quality and chemical composition of Sudanese white cheese. M.Sc. Thesis, University of Khartoum, Sudan, 1992.
7. Ahmed I A M, Morishima I, Babiker E E and Mori N. Characterization of partially purified milk-clotting enzyme from *Solanum dubium* fresen seeds. Food Chem., 2009a; 116:395–400.
8. Ahmed I A M, Babiker E E and Mori N. PH stability and influence of salts on activity of a milk-clotting enzyme from *Solanum dubium* seeds and its enzymatic action on bovine caseins. LWT Food Sci. Technol,2010; 43:759–764.
9. Badgujar S B and Mahajan R T. Nivulian-II A new milk clotting cysteine protease of *Euphorbia nivulia* latex. Inter. J. Biol. Macromol, 2014; 70:391–398.

10. Tajalsir A E, Ebraheem A S A, Abdallah A M, Khider F J, Elsamani M O and Ahmed, I A M. Partial purification of milk clotting enzyme from the seeds of *Moringa oleifera*. J. Microbiol. Biotech. Food Sci., 2014; 4:58–62.
11. Jacob M, Jaros D and Rohm H. Recent advances in milk clotting enzymes. Inter. J. Dairy Technol,2011; 64:14–33.
12. Anusha R, Singh MK and Bindhu O S. Characterization of potential milk coagulants from *Calotropis gigantean* plant parts and their hydrolytic pattern of bovine casein. Eur. Food Res. Technol, 2014; 238:997–1006.
13. Park, H,Yamanaka N, Mikkonen A, Kusakabe I and Kobayashi H. Purification and characterization of aspartic proteinase from sunflower seeds. Biosci. Biotechnol. Biochem,2000; 64:931–939.
14. Egito A S, Girardet J M, Laguna, L E, Poirson, C, Molle D and Miclo L. Milk-clotting activity of enzyme extracts from sunflower and albizia seeds and specific hydrolysis of bovine k-casein. Inter. Dairy J, 2007; 17:816–825.
15. Nasr A I A, Ahmed I A M and Hamid O I A. Characterization of partially purified milk-clotting Enzyme from sunflower (*Helianthus annuus*) seeds. Food Sci. Nutr., 2015; 1: 1-9.
16. Talib, A. M; Abubakar, M. M. and I. A. Jideani. Effect of different concentrations of jiben (*Solanum dubium*) seed extracts on the physicochemical and organoleptic properties of soft cheese. J. Agric. Sci. Mansoura, 2006; 31:6951–6953.
17. Talib A M, Abubakar M M, Jideani I A and Hassan A. Use of Jiben seeds extract to manufacture soft white cheese. Am. J. Appl. Sci., 2009; 6:551–554.
18. Larmond E. Laboratory Methods of sensory Evaluation of food. Canadian government publishing center, Ottawa, On, Canada, 1987**.**
19. Abdalla M O and Abdel Razig K A. Effect of Type of Milk on the Quality of White Soft Cheese. Khar. Uni. Jour. Agric.,1997; 5 (2), 147- 157.
20. Queiroga R de. C R E, Santos B M, Gomes A M P, Monteiro M J, et al.,. Nutritional, textural and sensory properties of Coalho cheese made of goats', cows' milk and their mixture. LWT - Food Sci. Technol, 2013; 50: 538-544.
21. CarpinoS, Home JM, Melilli C, Licitra G et al.,. Contribution of native pasture to the sensory properties of Ragusano cheese. J. Dairy Sci., 2004; 87(2): 308- 315.
22. Kheir Sana E O, El Owni O A O and Abdalla M O M. Comparison of Quality of Sudanese White Cheese (Gibna bayda) Manufactured with Solanum
23. dubium Fruit Extract and Rennet. Pak. J. Nutr, 2011; 10 (2): 106 – 111.
24. Abdul-Rahaman S. Using of Safflower (*Cortamus tinctures*) seeds extract for white cheese manufacturing. J. Univ. Tikrit Agric. Sci., 2013; 13:57–64.
25. Roseiro L B, Barbosa M, Ames J M and Wilbey A. Cheese making with vegetable coagulants—the use of Cynara L. for the production of ovine milk cheese. Inter. J. Dairy Technol, 2003; 56:76–85.