MILK QUALITY IN MOUNTAIN RUCAR AREA

Adrian Timar*

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea;
Romania, e-mail: atimar@uoradea.ro

Abstract

This study research the quality of fresh cow, buffalo and shep milk in order to optimised the producing daiery products. Althrough we try to find how parameters of milk are changed during studied period and if this parameters are significant variable. The final results will are integrated in an larger study regarding the comparison of quality of cow, buffalo and sheep milk during studied period. The study was conducted in 2011 during spring in Rucăr, Romania area.

Key words : cow milk, sheep milk, quality parameters, buffalo milk, lactose.

INTRODUCTION

For evaluation the cow, buffalo and sheep milk quality we study Organolepticall (taste, smel and color) and Physico – chemical parameters. Methods used for analysis are according with romanian standards and are quottation in latest studys. The device used was Lactostar from FunkeGerber company. The milk was colected from the farm of Duruianu Ionut. The milk was colected from two cows, Bălţată Românească breed, 3 buffalo female and 332 sheeps, Turcana breed. The milk was colected in the morning at first milking and the animals where in free stabulation on the hill pasture without fertilisation.

MATERIALS AND METHODS

Taking samples: We use to take samples glass probes. From serface and upper layers samples was taken with cilindrical probes after homogenisation. Procedure was according to S.TA.S. 9535/1-74 and STA.S. 9535/2-74.

1.Organoleptical analysis: Was study colour, aspect, smell and taste of milk according with Georgescu Gh., 2005. If those parameters was out of normal range milk was considered out of standards and study of those samples was ended.

2.Physical analysis : We study follow parameters : fat percent, non faty dry matter, protein content, acidity, lactose ratio, freezing point, mineral content and milk conductivity.

We use the LactoStar device from Funke Gerber with following parameters :

Table 1. LactoStar parameters

Constituents	Disolving	Repetability
Fat	0,01 %	+0,02%
Protein	0,01 %	+0,03%
Lactose	0,01 %	+0,03%
SNF (nonfaty dry matter)	0,01 %	+0,04%
Freezing point	- 0,001 ºC	+0,02%
Mineral content	0,01 %	+0,02%
Conductivity	0,01 %	+0,02%

3. Experimental Methodic

Samples was study according following schema :

V_1 – 11 May; V_2 – 12 May; V_3 – 13 May ; V_4 – 14 May, V_5 – 15 May, V_6 – 16 May, V_7 – 17 May, V_8 – 18 May, V_9 – 19 May, V_{10} – 20 May, V_{11} – 21 May, V_{12} – 22 May.

4. Biological material

We study cow milk from two cow Bălţată Românească breed from Rucăr area, 3 buffalo female, Romanian Buffalo breed from Rucăr area and 332 sheeps, Turcana breed from Rucăr area from the farm of Duruianu Ionuţ.

RESULTS AND DISCUSSION

1.Organoleptical analysis:

Colour, Aspect, Smell and Taste was according with standards and was no deviation from this point of wiew.

2.Physical analysis :

Table 1. Fat percent, %

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	3,21	3,11	3,23	3,31	3,12	3,45	3,32	3,14	3,53	3,21	2,98	3,11
2	Buffalo milk	7,62	7,13	7,39	7,31	7,23	7,87	7,62	7,45	7,31	7,30	7,45	7,59
3	Sheep milk	7,10	7,21	6,72	7,01	6,91	7,03	7,12	7,10	6,92	6,99	7,11	7,26

The fat percentage was in the normal range. The minimum was 2,98% for cow milk as a consequence of the periode and because intensive milking during week.

The fat percentage was in the normal range of buffalo milk, close to the maximum value. This was a consequence of the periode, because the lack of suplimentary feeds during the week and a moderate milking.

The fat percentage was in the normal range of sheep milk, close to the minimum value. The minimum was a consequence of the periode and because the lack of suplimentary feeds during the week.

Table 2. Non faty dry matter, %

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	9,69	8,91	9,23	9,38	9,64	9,42	9,15	9,57	9,47	9,34	9,61	9,28
2	Buffalo milk	17,21	17,32	17,29	17,45	17,27	17,56	17,64	17,29	17,33	17,45	17,21	17,15
3	Sheep milk	12,16	12,23	12,34	12,45	12,65	12,45	12,76	12,45	12,37	12,33	12,18	12,43

The SNF is at the higher rates because of the minimum production of milk. That reveal the high value of the milk colected in this periods and it will be valuable for milk evaluation for chees production.

The SNF is at the higher rates because of the production level. That reveal the high value of the buffalo milk colected in this periods and it will valuable for chees production.

The SNF is at the lower rates because of the maximum production of sheep milk. That reveal the low value of the milk colected in this periods and it will be not very valuable for chees production.

Table 3. Protein content, %

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	3,67	3,71	3,41	3,47	3,59	3,67	3,71	3,51	3,47	3,21	3,12	3,33
2	Buffalo milk	6,23	6,12	6,45	6,34	6,73	6,23	6,54	6,29	6,49	6,31	6,78	6,45
3	Sheep milk	4,59	4,50	4,65	4,32	4,51	4,36	4,44	4,71	4,62	4,53	4,66	4,56

The protein content had the same evolution like fat content and it is not afected by the period.

The protein content have high rates becase of the presence of green feed in this time and for this reason the milk will be very good for dairy products.

The protein content have high rates becase of the presence of lambs in this time and for this reason the milk will be very good for dairy products.

Table 4. Acidity, T°

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	18	17	18	16	16	17	16	18	19	18	17	18
2	Buffalo milk	16	16	15	15	15	15	15	15	16	15	17	17
3	Sheep milk	27	25	31	28	30	25	24	19	19	19	21	28

The cow milk was fresh, the acidity reveal that the milk was analized after milking and is suitable for cheese production.

The buffalo milk was also fresh, the acidity reveal that the milk was analized after milking and is suitable for processing.

The milk from sheeps was fresh, the acidity reveal that the milk was analized after milking and is suitable for processing.

Table 5. Lactose ratio, %

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	5,33	5,21	5,61	5,32	5,12	5,34	5,41	5,27	5,29	5,28	5,17	5,24
2	Buffalo milk	5,87	5,77	5,83	5,91	5,44	5,83	6,11	6,08	6,01	5,84	5,92	5,96
3	Sheep milk	6,59	6,64	6,43	6,23	6,31	6,44	6,52	6,54	6,63	6,62	6,57	6,48

High ratio of lactose are the consequence of the green feeds and the suplements in cow ratio.

High ratio of lactose are the consequence of the green feeds and the active methabolism of the buffalo, the high amounts are also influenced by specific high altitude flora present in the pasture.

High ratio of lactose are the consequence of the green feeds and the active methabolism of the sheeps.

Table 6. Freezing point, C°

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	-0,571	-0,562	-0,531	-0,547	-0,555	-0,573	-0,583	-0,567	-0,581	-0,532	-0,547	-0,571
2	Buffalo milk	-0,758	-0,754	-0,761	-0,732	-0,741	-0,744	-0,723	-0,755	-0,764	-0,738	-0,745	-0,752
3	Sheep milk	-0,706	-0,702	-0,714	-0,708	-0,702	-0,709	-0,714	-0,712	-0,701	-0,700	-0,704	-0,720

Freezing point is normal and reveal that are no falsifications of the milk.

Table 7. Mineral content, %

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	0,76	0,75	0,72	0,77	0,73	0,75	0,74	0,75	0,75	0,75	0,75	0,76
2	Buffalo milk	0,85	0,84	0,91	0,92	0,92	0,90	0,93	0,95	0,96	0,98	0,91	0,92
3	Sheep milk	0,82	0,79	0,78	0,79	0,81	0,84	0,83	0,82	0,86	0,84	0,83	0,84

Mineral content is very high at the maximum level for cow milk because the low production and feeding cows with fresh grass.

Mineral content is high because of the feeding with fresh grass in the case of buffalo milk.

Mineral content is very high at the maximum level for sheep milk because of the feeding with fresh grass.

Table 8. Milk conductivity, mS/cm

No.	Sample	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
1	Cow milk	29,56	29,54	29,54	29,56	29,51	29,55	29,56	29,56	29,54	29,54	29,56	29,56
2	Buffalo milk	28,87	28,76	28,68	28,57	28,65	28,78	28,73	28,56	28,34	28,37	28,59	28,45
3	Sheep milk	34,65	34,59	34,61	34,53	34,45	34,60	34,58	34,61	34,61	34,49	34,59	34,61

The milk conductivity reveal that was no exogen NaCl inside, the milk is authentic.

CONCLUSIONS

For milk allocation in processing flow it is necessary to have a real image of his quality in real time.

For a better and quick feedback of the milk quality management we use the high-tech Lacto Star electronic milk analyzer for basic physical – chemical parameters. The device was connected to a printer and was also connected to a portable personal computer.

Because of high content in lactose and proteins the milk analyzed is the best row material for acid dairy products. That improves the organoleptical parameters like taste, flavor and viscosity.

The high content in proteins recommends the milk also for cheese production.

Milk freezing point is at levels that are normal and prove the milk good quality.

The milk conductivity reveal that was no exogen NaCl inside, the milk is authentic.

The analyzed milk had all parameters in normal range at the high levels, proper for all kind of dairy products.

There was no significant diferences in the values of analyzed parameters.

REFERENCES

1. American Public Health Association, 1992, "Standard methods for the examination of dairy products". R.T. Marshall PhD, Edtitor, 16th Edition,

2. Ardelean M., R Sestraş., M. Cordea., 2005, Tehnică experimentală horticolă, Edit. Academicpres, Cluj – Napoca,

3. Bani P., Sandrucci S. 2003, Il metodo biologico e la qualità del latte. Sc.Tecn.Lattiero-Casearia, 54,   267-286,

4. Banu, C., 2008, *Tratat de industrie alimentară. Probleme generale*, Ed. ASAB, Bucureşti, 608 p

5. Bennedsgraard A.W., Thamsborg S.M., Vaarst M., Enevoldsen C., 2003, Eleven years of organic production in Denmark: herd health and production related to time of conversion and compared to conventional production. Livestock. Prod.. Sci., 80, 121-131,

6. Bishop, J. R. A simple shelf life estimation method as an integral part of a total dairy quality assurance program. *Dairy, Food Environ. Sanitation* 1989, *12*, 698-701.

7. Bishop, J. R.; White, C. H. Assessment of dairy product quality and potential shelf life a review. *J. Food Prot.* 1986, *49*, 739-753.

8. Bishop, J. R.; White, C. H.; Firstenberg-Eden, R. Rapid impedimetric method for determining the potential shelf life of pasteurized whole milk. *J. Food Prot.* 1984, *47*, 471-475.

9. Bossuyt, R. A 5-minute ATP platform test for judging the bacterial qulality of raw milk. *Neth. Milk Dairy J.* 1982, *36*, 355-364.

10.   CZAPLICKA M., PUCHAJDA Z., IWAŃCZUK K., IWULSKI Z., 1993 – Wpływ stanu zdrowotnego wymienia na wydajność i skład mleka krów rasy CB i CB x HF. I Poszczególne laktacje (Effect of health status of the udder on yield and composition of milk in Black – and-White and Black-and- White x HF cows. I. Individual lactations). *Acta Acad. Agricult. Tech. Olst. Zootechnica*, 38, 27- 38.

11. GEORGESCU Gh. and col., 2000, *Laptele şi produsele lactate*. Ed. Ceres, Bucureşti

12. Ghidini S., Zanardi E., Battaglia A., Pinotti M.A., Varisco G., Campanini G., Chizzolini R., 2002 – Indagine sulla presenza di contaminanti chimici in latte e carne di produzione tradizionale e biologica. Ann.Fac.Med.Vet. Parma, 22, 87-97,

13. Hermansen J.E., 2003, Organic production systems and appropriate development in relation to public expectations. Livestock Prod.Sci., 80, 3/15,

14. KLINDTWORTH M., 1998 – Von der elektronischeu Tierkennzeichnung zum Gesundheitsmanagement. *Elektronik in der landtechnik, FAT – Schriftenreihe*, 59, 33-46.

15. Kouba M., 2003, Quality of organic animal products. Livestock Prod.Sci., 80, 33-40

16. Marsili, R. T. Comparison of solid-phase microextraction and dynamic headspace methods for the gas chromatographicmass pectrometric analysis of light-induced lipid oxidation products in milk. *J. Chromatogr. Sci.* 1999a, *37*, 17-22.

17. Marsili, R. T. SPME-MS-MVA as an electronic nose for the study of off-flavors in milk. *J. Agric. Food Chem.* 1999b, *47*, 648-654.

18. Marsili, R. T.; Miller, N. Determination of the cause of offflavors in milk by dynamic headspace GC/MS and multivariate data analysis. In *Food Flavor Formation, Analysis,and Packaging Influences*;

19. MEIER W., 1998 – Elektronik, Lantechnik und „Precision forming". *Elektronik in ger Landtechnik, FAT – Schriftenreihe*, 59, 5-10.

20. Mussinan, C., Contis, E., Ho, C.- T., Parliament, T., Spanier, A., Shaidi, F., Eds.; Elsevier Science Publishers: Amsterdam, The Netherlands, 1998; pp 159-171.

21. Oprean, L., 2002, *Analiza microbiologică a produselor alimentare*, Ed. Univ. "Lucian Blaga", Sibiu, 182 p.

22. Patel, G. B.; Blankenagel, G. Bacterial counts of raw milk and flavour of the milk after pasteurization and storage. *J. Milk Food Technol.* 1972, *35*, 203-206.

23. Phillips, J. D.; Griffiths, M. W. Bioluminescence and impedimetric methods for assessing shelf life of pasteurized milk and cream. *Food Microbiol.* 1985, *2*, 39-51.

24. Toledo P., Andrèn A., Björck, 2002, Composition of raw milk from sustainable production systems. Int.Dairy J., 12, 75 –80,

25. Urbach, G.; Milne, T. The concentration of volatiles in pasteurized milk as a function of storage time and storage temperaturesa possible indicator of keeping quality. *Aust.J. Dairy Technol.* 1988, *43*, 53-58.

26. Vallejo-Cordoba, B.; Nakai, S. Keeping-quality assessment of pasteurized milk by multivariate analysis of dynamic headspace gas chromatographic data. 1. Shelf life prediction by principal component regression. *J. Agric. Food Chem.* 1994, *42*, 989-993.

27. Van Crombrugge, J.; Waes, G.; and Reybroeck W. ATP-F test for estimation of bacteriological quality of raw milk. *Milk Dairy J.* 1989, *43*, 347-354.

28. WĘGLARZY K., WAWRZYŃCZAK S., KACZOR A., BILIK K., BEREZA M., KRASZEWSKI J., 2008 – Proekologiczna technologia produkcji mleka wysokiej jakości na fermie o obsadzie 200 krów w cyklu zamkniętym (Pro-ecological technology of high-quality milk production on

the farm maintaining 200 cows in closed cycle). Published by the National Research Institute of Animal Production, Cracow, 5-30.,

29. WENDEL G., 1998, Elektronikeinsatz in der Rinderhaltung – von der Identifizierung bis zur Automatisierung. *Elektronik in der Landtechnik, FAT – Schriftenreihe*, 59, 101-112.