*Assiut J. of Agric. Sci., 42 No.(4) (1-12)*

# Comparative Study on Chemical Composition and Minerals Content of Buffalo Milk in Assiut City

**Dalia. G. Kamel, Nanis H. Gomah and A.I. Hasan**
Dariy Dept. Fac. Agric., Assiut Univ., Assiut

**Abstract**

The study was carried out to evaluate the chemical composition and minerals content of buffaloes milk collected from individual animals and vendors bulk milk in Assiut city. Samples were collected and analysed each 10 days from three individual farmers (one buffalo from each), and three milk vendors during the period between December (2010) to February (2011).

The obtained results showed that the main milk constitutes were found to be at higher levels in the individual samples. Values of total solids, fat, total nitrogen and lactose, ranged between 14.430 to 16.550%, and 5.4 to 7.2% and 0.665 to 0.940% and 3.828 to 5.500% for the individual milk, respectively. In bulk milk samples Values of total solids, fat, total Nitrogen and lactose, ranged between 14.604 to 15.293% and5.5 to 6.5% and 0.562 to 0.676% and 3.620 to 4.933% respectively. The specific gravity of individual milk was slightly higher than that of bulk milk samples 1.030 to 1.035 and 1.029 to 1.033 gm/cm3 respectively.

Concerning milk fat constants, the iodine number was mostly lower while Polenske and Reichert- meisel number were higher in the individual samples comparing with that for the bulk samples. However no big difference was found in the saponification number for individual and bulk samples. The results of ash contents showed that bulk buffaloes milk samples showed higher contents ranged from (4.696 to 6.626) mg/kg as compared to individual samples (4.023-5.553) (mg/kg). Metals, i.e. iron, calcium, sodium and phosphorus were found in higher levels in bulk samples. However magnesium was found in the same levels in bulk and individual samples.

Samples available in Assiut markets may suspect to be adulterated by vendors with adding water, or removing cream. The overall picture of buffalo's milk quality in Assiut markets as measured by chemical composition evaluation appears to indicate a need for emphasis on quality roles within milk vendors. There is a need to the activate regulations of the standard limits to control the quality of buffalo milk collected from vendors.

**Key words:** Buffalo milk, Chemical composition, Physical properties, Fat constants, Mineral content

## Introduction

Buffalo milk is very white and beautifully smooth, it differs considerably in composition

**Received on**: 15/12/2011 **Accepted for Publication on**: 8/1/2012
**Referees**: Prof.Dr. Yousef H. Shahen Prof.Dr. Gamal E. A. Mohran

from cow's milk. Buffalo milk contains more fat, protein, calcium and phosphorus than cow's milk. The high milk solids of buffalo milk make it ideal for processing into dairy products, (Abd Elsalam *et al.*, 1982 and Hofi *et al.*, 1982).

Buffalo milk has excellent physical and chemical qualities as a consequence of high percentage of constituents. This milk property is desirable for dairy industry because it facilitates manufacture of mozzarella cheese (Aspilcute- Borquis, *et al.*, 2010).

Compared with cow's milk, buffalo milk has higher percentage of all components such as protein and fat. The mean protein and fat percentage reported for buffalo milk varies from 4.13 to 4.55% (Macedo *et al.*, 2001, Rosati and van Vleck 2002) and from 6.87 to 8.59% (Tonhati *et al.*, 2000), respectively. In spite of its higher fat percentage which is of major interest, some studies reported a larger number of small fat globules in buffalo milk as compared to bovine and sheeps milk. It is well known that small fat globules are rich in polyunsaturated fatty acids (Martini et al., 2003 and Zicarelli, 2004 ).

Buffalo milk is richer in calcium, phosphorus, magnesium and iron, and contain less sodium and potassium. Peroxidase activity is 2-4 times higher than in cow's milk which means that it may be able to be preserved for longer time. (Borghese and Moioli, 2002).

Few studies had been done in order to determine the percentage of each components, i.e., fat, protein, lactose, minerals and vitamins in buffalo milk as well difference factors which can affect the percentage of each component, (Gang and Qingb 1994, Sharma, *et al.*, 1996. Spanghero and Susmel 1996, Kholif 1997, Fundora *et al.*, 2001, Anilkumar, *et al.*, 2003, Athar, *et al.*, 2003, Mandal, *et la.*, 2004).

Many factors can affect composition of milk, from these factors, animal age, stage of lactation, animals nutrition, sometimes buffalo were fed some sorts of levered feeds like garlic, onion, silage, fish meal etc. as well working animals. It is well known that individual farmers are more honest and they are not adulterate milk with water or other adulteration ingredients. Hence, the present research has been undertaken to evaluate the quality of buffalo milk collected from individual farmers and vendors in Assiut City.

**Material and Methods**

**1. Sampling:**

The milk samples were collected from two different sources, individual farmers and vendors, in Assiut City .These milk Samples of buffaloes milk were collected each 10 days from 2 different sources during the period from December (2010) to February (2011):-

a- Three individual random samples were taken from three different farmers, one buffalo from each.

b- Three bulk milk vendors in Assiut City.

At each time of sampling 500 ml of milk were taken and transferred immediately in ice box to the laboratory where it was analyzed for the following determination. All the data shown in the results are the average of three different samples from three different buffaloes

**2 Chemical determinations:-**

Specific gravity: Specific gravity was determined as previously described by Mowafak (1989).

Fat content: - Fat content was determined by using Rose Gottlieb method according to the International Standard FIL/ IDF: IC (1987).

Titratable acidity: - Determination of the Titratable acidity was carried out according to the method described in A.O.A.C. (1990).

Moisture content: - Determination of moisture content had been carried out according to the International Standards FIL/IDF: 21 B (1987).

Total nitrogen content: - Total nitrogen content was determined according to the International Standards FIL/ IDF: 20 A (1986).

Soluble nitrogen and non protein nitrogen was determined by using Micro Kieldahl method according to the A.O.A.C. (1997).

Lactose: - Lactose was determined according to the International Standard FIL/IDF: 28 A (1974)

Ash: - Ten grams of milk sample was evaporated in a water bath at 100 °C ,then Heated in a muffle furnace at 550°C until the ash residues remained.

Metals content: - Different metals i.e., iron, copper, manganese, zinc, calcium Magnesium and potassium were determined in ash according to the Method described by Sotera and Stux (1979) using Atomic Absorption spectrophotometer, G.B.C 906 AA (Atomic Absorption)

Iodine value: - The iodine value was determined according to the International Standard FIL/IDF: 8 (1959).

Saponification number:- Determination of saponification number had been carried out according to the A.O.A.C., 2000.

Polenske number: - Polenske number was determined according to the International Standard FIL/IDF 37(1966).

Reichert Meisel: - Reichert Meisel was determined according to the International Standard FIL/IDF 37(1986).

**Results and Discussion**

The specific gravity of individual and bulk buffaloes milk samples ranged from 1.030 to 1.035 and from 1.029 to 1.033 respectively (Table 1). These results agree with Kay (1977) who observed that the specific gravity of buffalo milk was in the range of 1.033, to 1.035. This is similar to the specific gravity of milk sample in this study.

The results obtained for the titratable acidity of different samples indicated that the individual

samples collected from the individual farmers always had higher acidity ranged from 0.160 to 0.180%. The corresponding values for bulk buffaloes milk samples where from 0.136 to 0.168% as lactic acid. (Table 1).

**Table 1:-Physical properties for bulk and individual milk**

| Samples date | Bulk milk | | Individual milk | |
|---|---|---|---|---|
| | Specific gravity | Acidity% | Specific gravity | Acidity% |
| **1 December** | 1.032 | 0.166 | 1.035 | 0.165 |
| **11 December** | 1.032 | 0.163 | 1.034 | 0.165 |
| **21 December** | 1.032 | 0.161 | 1.031 | 0.180 |
| **31 December** | 1.032 | 0.168 | 1.033 | 0.180 |
| **10 January** | 1.029 | 0.150 | 1.030 | 0.175 |
| **20 January** | 1.030 | 0.160 | 1.030 | 0.177 |
| **30 January** | 1.029 | 0.153 | 1.030 | 0.160 |
| **9 February** | 1.030 | 0.160 | 1.030 | 0.165 |
| **19 February** | 1.030 | 0.166 | 1.031 | 0.180 |
| **1 March** | 1.033 | 0.136 | 1.031 | 0.170 |

The results of total solids content of milk from individual farmers and vendors were between 14.430 and 16.550% and between 14.604 and 15.293%, respectively (Tables 2 and 3) which indicate that individual samples always contain higher total solids comparing with bulk samples. The fat content of the samples from the individual farmers and vendores milk ranged from 5.4 to 7.2% and from 5.50% to 6.5%, respectively (Tables 2 and 3). These results agree with the findings of Sharma, *et al.*, (1980) who found that fat percentages of buffalo milk samples were between 6.00 to 7.80%.

Results obtained of total nitrogen and non- protein nitrogen of different samples are given also in Tables 2 and 3. Individual buffaloes milk sample has higher total nitrogen contents ranged from 0.660 to 0.940% as compared to the vendors samples where these contents ranged from 0.562 to 0.676%. The obtained results can supported by the results of Kanwal *et al.* (2004) who found the total nitrogen contents of buffalo milk were ranged from 0.60 to 0.75%.

As shown in Tables 2 and 3 the values of N.P.N in the individual and in the bulk buffaloes milk samples showed minor difference between the two groups, and were similar to that found by Kanwal *et al.* (2004).

As shown in Tables 2 and 3, the values of soluble nitrogen contents in buffalo milk samples collected from the two experimental sources showed also minor differences. The soluble nitrogen contents in the individual samples ranged from 0.107 to

0.154 gm/100gm. The corresponding values from bulk samples were 0.092 to 0.129 gms /100gms.

The obtained results for the lactose content in samples of individual farmers and vendores are presented in Tables 2 and 3. Results indicated that, in most cases samples of individual farmers contained higher percentage of lactose. In comparsion with samples collected from the vendors. These contents of lactose were normally in relation with acidity of both samples. As the vendors samples may subjected to some conditions which may enhance microbial growth, the obtained results agree with the results obtained with Payne *et al.*, (1990).

**Table 2:-Chemical composition for bulk milk**

| Samples date | Bulk milk | | | | | |
|---|---|---|---|---|---|---|
| | T.S % | Fat% | T.N% | N.P.N% | S.N% | Lactose% |
| 1 December | 15.293 | 6.1 | 0.653 | 0.024 | 0.129 | 3.750 |
| 11 December | 15.203 | 6.4 | 0.589 | 0.020 | 0.092 | 3.860 |
| 21 December | 14.972 | 5.9 | 0.656 | 0.048 | 0.123 | 4.060 |
| 31 December | 15.245 | 6.1 | 0.592 | 0.023 | 0.122 | 3.620 |
| 10 January | 14.779 | 5.9 | 0.562 | 0.013 | 0.124 | 4.430 |
| 20 January | 14.733 | 5.5 | 0.676 | 0.028 | 0.118 | 4.440 |
| 30 January | 14.604 | 5.9 | 0.658 | 0.015 | 0.102 | 4.110 |
| 9 February | 14.666 | 6.1 | 0.670 | 0.015 | 0.106 | 4.500 |
| 19 February | 14.833 | 6.1 | 0.666 | 0.017 | 0.115 | 4.580 |
| 1 March | 15.010 | 6.5 | 0.673 | 0.022 | 0.123 | 4.933 |

**Table 3:-Chemical composition for individual milk**

| Samples date | Individual milk | | | | | |
|---|---|---|---|---|---|---|
| | T.S % | Fat% | T.N% | N.P.N% | S.N% | Lactose% |
| 1 December | 14.430 | 5.4 | 0.675 | 0.022 | 0.142 | 4.322 |
| 11 December | 15.332 | 6.7 | 0.745 | 0.016 | 0.154 | 3.828 |
| 21 December | 16.036 | 7.1 | 0.815 | 0.006 | 0.127 | 3.925 |
| 31 December | 16.309 | 7.2 | 0.735 | 0.023 | 0.126 | 4.180 |
| 10 January | 15.825 | 6.2 | 0.665 | 0.013 | 0.145 | 4.595 |
| 20 January | 16.000 | 6.7 | 0.710 | 0.029 | 0.120 | 4.750 |
| 30 January | 16.250 | 6.8 | 0.940 | 0.018 | 0.110 | 4.865 |
| 9 February | 15.500 | 6.3 | 0.740 | 0.017 | 0.107 | 4.750 |
| 19 February | 15.650 | 6.2 | 0.780 | 0.016 | 0.120 | 4.900 |
| 1 March | 16.550 | 6.9 | 0.785 | 0.021 | 0.125 | 5.500 |

**T.S:- Total solid T.N:-Total Nitrogen N.P.N:-Non protein nitrogen S.N:-Soluble nitrogen**

The iodine values of both individual and bulk buffaloes milk samples are shown in Table 4. Data for the individual sam-

ples showed less difference between minimum and maximum values for iodine values being from 28.965 to 38.600, the corresponding values for the bulk samples were between 32.020 and 41.750.

The same differences were observed in the other milk fat constants i.e., Saponification number, Reichert- Meisel and Polenske numbers (Table 4). The saponification number ranged from 220.42 to 241.18, the Reichert- Meisel ranged from 33.05 to 40.98 and the Polenske number ranged from 0.95 to 2.25 for the individual samples and for the bulk buffaloes samples. The saponification values ranged from 221.84 to 236.88, the Reichert- Meisel ranged from 32.67 to 38.83 and the Polenski number ranged for 0.96 to 1.70. These changes in milk fat constants can be due to several reasons such as animal age, stage of lactation, climatic conditions, animal feeding as well as housing. On the other hand, vendors may adulterate milk with water, or by other cheaper ingredients to earn more profit. So, necessary steps should be taken to improve the quality of buffalo milk usually collected from vendors.

**Table 4:-Fat constants for bulk and individual milk**

| Samples date | Bulk milk | | | | Individual milk | | | |
|---|---|---|---|---|---|---|---|---|
| | Reichert-Meisel No. | Polenske No. | Iodine No. | Saponification No. | Reichert-MeiselN.o | Polenske No. | Iodine No. | Saponification NO. |
| 1 December | 32.67 | 1.23 | 28.27 | 236.88 | 35.92 | 1.10 | 34.74 | 228.06 |
| 11 December | 35.86 | 1.23 | 38.03 | 227.90 | 38.66 | 2.25 | 37.58 | 228.51 |
| 21 December | 35.56 | 1.00 | 35.99 | 216.03 | 39.08 | 1.05 | 33.54 | 227.80 |
| 31 December | 38.83 | 0.96 | 37.42 | 233.33 | 36.83 | 1.40 | 28.96 | 241.18 |
| 10 January | 37.76 | 1.36 | 32.02 | 230.99 | 36.75 | 2.00 | 30.93 | 230.00 |
| 20 January | 36.48 | 1.00 | 36.87 | 221.55 | 33.05 | 0.95 | 35.75 | 221.00 |
| 30 January | 38.07 | 1.33 | 36.24 | 230.94 | 34.75 | 1.35 | 38.60 | 225.65 |
| 9 February | 35.17 | 1.46 | 32.05 | 212.84 | 40.98 | 1.35 | 31.87 | 226.61 |
| 19 February | 34.67 | 1.26 | 32.84 | 231.18 | 34.20 | 1.30 | 30.05 | 229.60 |
| 1 March | 34.05 | 1.70 | 41.75 | 227.32 | 35.43 | 1.45 | 35.25 | 220.42 |

1 ml 1/10 N NaoH Required to neutralize the fatty acids from distillation of 5gm

sample. 2 cg $I_2$ adsorbed / g 3 mg KoH/ G

The values of ash contents in individual and bulk buffaloes milk samples are given in Tables 5 and 6. The ash contents in bulk samples varied from 4.696 to 6.626 mg/kg. These were higher than individual milk samples which showed ash contents varied from 4.023 to 5.553 mg/kg. These values are partly confirmed to normal range of ash contents in buffaloes milk, (Eckles *et al.*, 1957, kanwal *et al.*, 2004, and kanwal *et al.*, 2002).

The levels of metal in individual and bulk buffaloes milk samples are shown in Tables 5 and 6. Iron was found in individual and buffaloes milk samples ranged from 0.286 to 0.925 and from 0.396 to 0.718 mg/kg, cupper from 0.275 to 0.803 and from 0.379 to 0.647 mg/kg, zinc from 0.150 to 0.523 and from 0.270 to 0.951 mg/kg, calcium from 0.085 to 0.617 and from 0.071 to 0.152 mg/kg, magnesium from 0.085 to 0.100 and from 0.013 to 0.020 mg/kg, potassium from 0.141 to 0.170 and from 0.142 to 0.192 mg/kg, sodium from 0.045 to 0.081 and from 0.046 to 0.081 mg/kg, while phosphorus was ranged from 0.132 to 0.353 and from 0.139 to 0.338 mg/kg respectively. The obtained results showed that iron, calcium, sodium and phosphorus were found at higher levels in individual buffaloes milk samples than bulk milk samples, while bulk buffaloes milk samples contained higher level of cupper, zinc and potassium. On the other hand magnesium was found in both individual and bulk samples almost at the same levels in same levels. The obtained results agree with the results of( El-Shabrawy and Hagrass 1980 and Enb *et al.*, 2009).

**Table 5:-Minerals content for bulk milk (mg/kg)**

| Samples | Bulk milk | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| date | Ash | Fe | Cu | Zn | Ca | Mg | K | Na | P |
| 1 December | 6 296 | 0.487 | 0.472 | 0.389 | 0.071 | 0.014 | 0.164 | 0.081 | 0.279 |
| 11 December | 6.600 | 0.588 | 0.485 | 0.951 | 0.083 | 0.019 | 0.163 | 0.069 | 0.139 |
| 21 December | 6.360 | 0.621 | 0.379 | 0.609 | 0.152 | 0.020 | 0.192 | 0.058 | 0.177 |
| 31 December | 6.483 | 0.482 | 0.618 | 0.703 | 0.142 | 0.020 | 0.163 | 0.060 | 0.185 |
| 10 January | 4.696 | 0.475 | 0.495 | 0.409 | 0.116 | 0.014 | 0.142 | 0.058 | 0.201 |
| 20 January | 5.610 | 0.396 | 0.596 | 0.475 | 0.138 | 0.016 | 0.151 | 0.061 | 0.338 |
| 30 January | 5.793 | 0.540 | 0.403 | 0.389 | 0.085 | 0.015 | 0.142 | 0.061 | 0.238 |
| 9 February | 6.626 | 0.531 | 0.589 | 0.270 | 0.086 | 0.013 | 0.155 | 0.053 | 0.274 |
| 19 February | 5.646 | 0.718 | 0.647 | 0.351 | 0.111 | 0.020 | 0.166 | 0.056 | 0.266 |
| 1 March | 5.276 | 0.544 | 0.409 | 0.398 | 0.137 | 0.014 | 0.163 | 0.046 | 0.222 |

**Table 6:-Minerals content for individual milk (mg/kg)**

| Samples date | Individual milk | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ash | Fe | Cu | Zn | Ca | Mg | K | Na | P |
| 1 December | 4.023 | 0.292 | 0.439 | 0.300 | 0.091 | 0.100 | 0.164 | 0.060 | 0.265 |
| 11 December | 5.053 | 0.687 | 0.742 | 0.424 | 0.617 | 0.023 | 0.151 | 0.045 | 0.132 |
| 21 December | 4.783 | 0.473 | 0.626 | 0.356 | 0.097 | 0.018 | 0.144 | 0.081 | 0.249 |
| 31 December | 4.523 | 0.286 | 0.506 | 0.333 | 0.116 | 0.013 | 0.144 | 0.080 | 0.353 |
| 10 January | 4.523 | 0.381 | 0.275 | 0.345 | 0.083 | 0.011 | 0.141 | 0.081 | 0.244 |
| 20 January | 5.300 | 0.411 | 0.612 | 0.523 | 0.144 | 0.017 | 0.144 | 0.048 | 0.337 |
| 30 January | 5.553 | 0.476 | 0.638 | 0.343 | 0.090 | 0.015 | 0.144 | 0.054 | 0.288 |
| 9 February | 4.573 | 0.486 | 0.608 | 0.150 | 0.085 | 0.013 | 0.155 | 0.054 | 0.311 |
| 19 February | 5.130 | 0.925 | 0.803 | 0.228 | 0.122 | 0.016 | 0.170 | 0.053 | 0.256 |
| 1 March | 5.553 | 0.632 | 0.561 | 0.432 | 0.155 | 0.014 | 0.149 | 0.059 | 0.272 |

On the other hand, comparing our results with the accepted upper limits of heavy metals (FIL/IDF, bulletin 133, (1979), resulted in higher than the legally mentioned accepted limit. The recorded limits of IDF bulletin 133 (1979) are 0.37, 0.10, 0.025 and 3.28 mg/kg milk for Fe, Cu, Mn and Zn, respectively.

On the other hand, concentrations of metals were compared with levels of metals found in raw milk samples of Abou-arab (1991) which were collected from Cairo during the period of 1988 to 1990. The present study revealed that the metals concentrations in different sampls may be attributed to the high contamination of animal feed and polluted water and could be excreted into milk at various levels.

**References**

Abou-Arab, A.A.K., (1991). Microbiological and compositional quality of dairy products in relation to some pollutants. Ph.D. Thesis, Faculty of Agriculture, Ain-Shams University.

A.O.A.C., Association of Official Analytical Chemist (1990). Official Methods of Analysis of Association of Official Agriculture Chemists. Wisconsin, George Banta Co. Inc.

A.O.A.C., Association of Official Analytical Chemists (1997). Official Methods of Analysis of Association of Official Agriculture Chemist. 16ed Virginia, U.S.A.

A.O.A.C., Association of Official Analytical Chemists (2000). Official Methods of Analysis of Association of Official Agriculture Chemists. Wisconsin. George Banta Co. Inc.

Abd El-Salam, M.H., S. El-shibiny, H.A., El Alamy and N. Mehanna (1982). Ultrafiltration of buffalo milk: some properties of skim milk retentates. Asian J. of Dairy Sci., 1: 35.

Anilkumar, K., Mohan, K.M.S. Ally, K., and Sathian, C.T. (2003). Composition and mineral levels of the milk of

kuttanad dwarf Buffaloes of Karla. Buffalo Bulletin, International Buffalo Information Center, Bangkok, Thailand, 22 (3) 67-70.

Aspilcueta Borquis. R.R, Dipalo.R, Araujo Neto.F.R, Baldi.F, decamargo. GMF,de Albuquerque.L.G, Zicarelli.L. and Tonhati.H (2010).Genetic parameter estimates for buffalo milk yield, milk quality and mozzarella production and Bayesian inference analysis of their relationships. Genetic and Molecular Research 9(3): 1636-1644.

Athar, I.H., Aziz, T. and Akram, M. (2003): Composition of buffalo and cow milk produced in different areas of the Punjab province, Pakistan. Pakistan Journal of Agriculture, Agriculture Engineering, Veterinary Sciences. Sindh Agriculture University, Tandojam, Pakistan, 19 (1) 43-52.

Borghese, A. and Moioli, B.(2002). Buffalo husbandry, Mediterranean Region. In:Hubert, R.(ed.) Encyl. of Dairy Sciences. Oxford: Elsevier.

Eckles, C.H., W.B. Combs and H. Macy (1957). Milk and milk products. 4th Edn. Mc Graw Hill book company, Inc., N.Y., USA, pp12.

El-Shabrawy, S.A. and A.E.A. Hagrass (1980). Some trace elements of buffaloes milk as determined by Atomic Absorption. Egyptian Journal of Dairy Sci., 8:103-107.

Enb, A., M.A. Abou Donia N.S., Abd-Rabou, A.A.K, Abou-Arab and M.H.EL-Senaity (2009). Chemical composition of raw milk and heavy metals behavior during processing of milk products. Global Veterinarian 3(3):268-275.

FIL / IDF: 8 (1959). Determination of the Iodine value of butter fat by Wigs method. International Dairy Federation, 41 Square Vergote, 1040 Bruxelles, Belgium.

FIL/ IDF: 37(1966). Determination of soluble and insoluble volatile fatty acid values of Milk fat. International Dairy Federation, 41 squares Vergote, 1040 Bruxelles, Belgium.

FIL / IDF: 28 (1974). Determination of the lactose content of milk. International Dairy Federation, 41, square vergote, 1040 Bruxelles, Belgium..

FIL / IDF, Bulletin 133 (1979). Chemical residues in milk products. International Dairy Federation, 41 square vergote 1040 Bruxelles, Belgium.

FIL/IDF: 20 A (1986). Milk: total nitrogen content (Kieldahl methods). International Dairy Federation, 41 square vergote, 1040 Bruxelles, Belgium.

FIL/IDF: IC (1987) Milk fat content (Rose Gottlieb) International Dairy Federation, 41

square vergote, 1040 Bruxelles, Belgium.

FIL/IDF 21B (1987).Milk, cream and evaporated milk, total solids. International Diary Federation, 41 square, vergote, 1040 Bruxelles, Belgium.

Fundora, O., Gonzalez, M.E., Lezcano, O., Montejo, A., Pompa, N. And Enrique, A.V., (2001). A comparative study of milk composition and stability of Murrah river buffaloes and Holstein cows grazing star grass. Cuban Journal of Agricultural science. Instituto de ciencia Animal of the Universidad Agraria de la Habana La Habana, Cuba, 35(3) 219-222.

Ganag, H. and Qingbo, D. (1994). A study on physico-chemical properties of Chinese buffalo milk. Journal of South China, Agricultural University 15: (4) 92-79.

Hofi, A.A., L.B. Abd El Hamid, A. Hagrass and E. Renner (1982): Studies on ultra filtration of buffalo milk: some physical and chemical characteristics of retentate. Ann. Agric. Sci. 27: 135.

Kanwal, R., T. Ahmed, I.H. Athar and B. Mizza (2002).Comparative analysis of quality of milk collected from Rawolpindi / Islamabad- region. Pak. J. Food Sci., 12:2933.

Kanwal Rashida , Togeer Ahmed and Bushra Mirza (2004). Comparative Analysis of quality of milk collected from buffalo, cow, goat and sheep of Rawalpindi / Islamabad Region in Pakistan. Asian Journal of plant sciences, 3 (3) 300 – 305.

Kay, H.D. (1977). The water buffalo food and agriculture organization of the United Nations.Vol. 4, p. 131.

Kholif, A.M. (1997). Effect of number and stage of lactation on the yield, composition and properties of buffaloes milk.Egyption J.Dairy Sci.,25: 25- 31.

Macedo M.B, Wechsler F.S, Ramos. AA, Amaral. J.B. (2001). Composition fisico-quimica e producao do leite de bufalas da raca Mediterraneo no oeste do Estado de Sao Paulo. Rev.Bras.Zoot (suppl 1) 30:1084-1088 Egyptian Journal of Dairy Science; 25 (1), 25-39.

Mandal, A.B., Yadav, P.S., Vanita Kapoor (2004). Mineral status of buffaloes milk under farm feeding condition of faridabad district of Haryana state. Indian Journal of Animal Nutrition, Animal Nutrition Society of India, karanl, India: 21 (2) 104-110.

Martini-M, Spinelli.S, Scolozzic and Cecchi F (2003). Studio sulle caratteristiche lipidiche del latte di bufale Allevate in Toscana: note II. Atti 11 cangresso Nazionale Sull allevamento del Bufalo, Roma, 28-30 Agosto, 147-151.

Mowafak, M.A. (1989). Studies on the detailed composition and properties of some con-

stituents of buffaloes milk. Ph.D. thesis, Faculty of Agriculture Ain Shams University.

Pyne, A.K., Maitra, D.N. and Majumder (1990). Effect of seasons on the composition of milk yield in Murrah Buffaloes in Agro-climatic conditions of west Bengal. Vet. Journal, 67 (10) 991-992

Rosati and Vleck (2002). Estimation of genetic parameters for milk, fat, protein and mozzarella cheese production for the Italian river buffalo *Bubalus bubalis population* Livestock production science 74 (185-190).

Sethi, R.K., Khathar, M.S., Kala, S. N and Tripath, V.N. (1996). Effect of pregnancy on milk constituents during later stage of Lactation in murrah buffaloes. Dairy science abstracts, 58 (5-9) 350.

Sharma, U.P., Rao, S.K. and Zariwala, I.T. (1980). Composition of different breeds of buffaloes milk. Indian Journal of Dairy Science, 33 (7), 315-318.

Sharma, K.C., Varindra, Sudarshan Singh (1996). Day to day variations in total cholesterol and some other components of milk from cow and buffalo during summer. Indian Journal of Dairy science, 49 (8) 472-476.

Spanghero, M. and Susmel, P. (1996). Chemical composition and energy content of buffalo milk. Journal of Dairy Research, 63 (4) 629-633.

Sotera, J.J. and Stux, R.L. (1979). Atomic absorbtion methods manual. Vol. l. std. cond. For flame. Operations. Int. Lab. Ine. Andover, MA., USA.

Tonhati, H., Vasconcellos, F.B. & Albuquerque, L.G., (2000). Genetic aspects of productive and reproductive traits in a Murrah buffalo herd in São Paulo, Brazil. J. Anim. Breed. Genet. 117, 331-336.

Zicarelli.L (2004) Buffalo milk: its properties, dairy yield and mozzarella production . Vet. Res. Commun (suppl 1) 28: 127-135.

# دراسة مقارنة علي المكونات الكيميائية و محتوي المعادن في اللبن الجاموسي في مدينة أسيوط

**داليا جمال كامل ،نانيس حسانين جمعه،علي اسماعيل حسن**
**قسم الألبان – كلية الزراعة – جامعة أسيوط**

تم في هذا البحث عمل دراسة مقارنة علي المكونات الكيميائية ومحتوي المعـــادن في اللبن الجاموسي المجمع من مصدرين هما :- المصدر الأول هو اللبن المجمع من الباعة الجائلين حيث تم أخذ 3 عينات من اللبن المجمع. والمصدر الثاني هـــو عينات لبن فردية مأخوذة من مزارعين مختلفين حيث يمتلك كل مزارع جاموســـة واحدة خاصة به حيث تم أخذ 3 عينات من الحيوانات الفردية.

وقد اثبتت النتائج المتحصل عليها في هذه الدراسة أن معظم مكونات اللبن كانـــت ذات مستوى عالي في العينات الفردية عن العينات المجمعة. حيث تراوحت نسبة الجوامد الصلبة الكلية ما بين 14,430–16,550 % و نسبة الدهن ما بين 5,4 – 7,2 % والنيتروجين الكلي ما بين 665, – 940, % و نسبة اللاكتوز من 3,238 – 5,500% و الكثافة النوعية من 1,030 – 1,035 جم/سم3 و ذلـــك بالنـــسبة للعينات الفردية .

بينما تراوحت نسبة الجوامد الصلبة الكلية في العينات المجمعـــة مـــن 14,604 – 15,293 % و نسبة الدهن من 5,5 – 6,5 % و النيتروجين الكلي مـــن 562, – 676, % و اللاكتوز من 3,620 – 4,933 % و الكثافة النوعية مـــن 1,029 – 1,033 جم /سم3 .

أما بالنسبة لثوابت دهن اللبن فكان الرقم اليودي أقل وكان رقم بولنـــسكي ورقـــم ريخرت ميسل أعلي في العينات الفردية و ذلك بالمقارنة بالعينات المجمعة . أمـــا بالنسبة لرقم التصبن فلا توجد إختلافات كبيرة بين العينـــات الفرديـــة و العينـــات المجمعة.

وكانت نتائج الرماد في عينات اللبن الجاموسي المجمعة أعلى و تراوحت ما بـــين 4,696 – 6,626 مجم /كجم و ذلك بالمقارنة بالعينات الفردية و التي تراوحـــت ما بين 4,023 – 5,553 مجم/كجم.

وأما بالنسبة للمعادن و هى الحديد و الكالسيوم و الصوديوم و الفسفور فقد وجدت بمستويات عالية في العينات اللبن المجمعة عن العينـــات الفرديـــة . بينمـــا كـــان الماغنسيوم في العينات الفردية و المجمعة بنفس المستوى .

وقد أظهرت النتائج أن العينات الفردية المجمعة من أسواق أسيوط يحتمل أن تكون تعرضت للغش بواسطة الباعة الجائلين و ذلك باحد وسائل الغش الميسورة لهم .

اظهرت الدراسة ان هناك حاجة ملحة لتفعيـــل القـــوانين الخاصـــة بالمواصـــفات القياسية للتحكم فى جودة اللبن الجاموسي المجمع بمعرفة الباعة الجائلين.