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SUMMARY

This study was carried out at Dairy Department, Faculty of Agriculture, Mansoura University, in cooperation with Sakha Laboratory Animal Production Research, located in the northern part of the Delta, belonging to the Animal Production Research Institute (APRI), Agricultural Research Center, Ministry of Agriculture.

Goat's milk samples (45) and cow's milk samples (48) used in the present study were taken from Sakha Experimental Station, Kafr Elshiekh Governorate for chemical analysis. Buffalo's milk samples (48) used in the present study were taken from Mahalet Mouse Experimental Station, Kafr Elshiekh Governorate for chemical analysis. Milk chemical analysis was as follows: Total Nitrogen (T.N), Fat content, total solids content (T.S), free amino acid (FAA) and major protein fractions. Methods of protein analysis: Kjeldahl, Formol and Milkoscan were determined.

Part (I): Studies on goat's milk

1. Find a factor of formol titration method for goat's milk protein:

All goat's milk samples were analysed for total nitrogen determination by Kjeldahl method and the conversion factor of 6.38 was used for calculation of protein.

Formol titration for the same samples was also done and the attained results were plotted against protein contents as given.

Formula factor of protein goat's milk using formol number:

	Factor			
% protein =	2.505001	* X	-	0.11748

X= ml. 0.1 N NaOH titre required to neutralize the acidity brought about by the addition of formalin.

Results were revealed the statistical analysis between estimated protein by Kjeldahl method and formol titration using 45 samples of goat's milk. After analyzing the results on the ANOVA (statistical analysis method), it was found that the differences were insignificant between protein contents measured by the two pre-mentioned methods.

2. The relationship between Kjeldahl and Milkoscan methods:

There was significant difference between Kjeldahl and Milkoscan methods in this respect and the correlation coefficient between Kjeldahl and Milkoscan methods could be obtained via equation as follows:

Formula factor of protein goat's milk using Kjeldahl and Milkoscan:

	Factor		
Kjeldahl =	1.2008	* X	- 0.4428

X = Protein determined using Milkoscan

3. Determined protein content (%) using Kjeldahl, formol and Milkoscan methods during milking period of goats:

Protein content using Kjeldahl method during milking period of goats were gradually increased from May to September with significant differences ($P < 0.05$). The highest value of protein content during September (4.625%) and the lowest during May (3.154%) and the moderate during June, July and August (3.538, 3.573 and 4.189%, respectively). On the other hand the overall mean of protein contents were 3.816%.

Protein content using formol titration method during milking period of goats were gradually increased from May to September with significant differences ($P < 0.05$). The highest value of protein content during September (4.802%) and the lowest during May (3.405 %) and the moderate during June, July and August (3.678, 3.614 and 4.155%, respectively). On the other hand the overall mean of protein contents were 3.931%.

Protein content using Milkoscan method during milking period of goats were gradually increased from May to September with significant differences ($P < 0.05$). The highest value of protein content during September (4.224 %) and the lowest during May (2.994%) and the moderate during June, July and August (3.320, 3.336 and 3.858%, respectively). On the other hand the overall mean of protein contents were 3.547%.

4. Determined fat content (%) during milking period of goats:

Fat content during milking period of goats were the lowest fat percentage during July (3.248%), while the highest during September (4.523%), the moderate during May, June and August (3.610, 3.458 and 3.877%). On the other hand the overall mean of fat contents were 3.743%.

5. Determined total solids content (%) during milking period of goats:

Total solids content during milking period of goats were the lowest fat percentage during May (11.017%), while the highest during September (13.431%), the moderate during June, July and August (11.169, 11.410 and 12.260%). On the other hand the overall mean of fat contents were 11.857%.

Part II: (A): Effect of the season of the year on goat's, cow's and buffalo's milk protein:

2. Protein contents determined using Kjeldahl, formol and Milkoscan methods:

Protein content using Kjeldahl method during milking period of cows were straight from January up to May with non-significantly differences and gradually increased from June to December with significant differences ($P < 0.05$). The highest value of protein content during November (3.700%) and the lowest during May (2.864%). On the other hand the overall mean of protein contents were 3.216%.

Protein content using formol method during milking period of cows were straight from January up to May with non-significantly differences and gradually increased from June to December with significant differences ($P < 0.05$). The highest value of protein content during November (3.557%) and the lowest during February (2.772%). On the other hand the overall mean of protein contents were 3.057%.

Protein content using Milkoscan method during milking period of cows were straight from January up to April with non-significantly differences and gradually increased from May to December with significant differences ($P < 0.05$). The highest value of protein content during December (3.875%) and the lowest

during April (2.700%). On the other hand the overall mean of protein contents were 3.201%.

Protein content using Kjeldahl method during milking period of buffaloes were decreased from January up to March with significantly differences ($P < 0.05$) and gradually increased from April to July without significant differences and decreased again on August and gradually increased up to the end of December. The highest value of protein content during January (4.057%) and the lowest during March (3.356%). On the other hand the overall mean of protein contents were 3.711%.

Protein content using formol method during milking period of buffaloes were decreased from January to March and straight from April up to June without significantly differences and gradually increased on July and decreased on August and increased up to the end of December. The highest value of protein content during January (3.913%) and the lowest during August (3.304%). On the other hand the overall mean of protein contents were 3.587%.

Protein content using Milkoscan method during milking period of buffaloes were decreased from January to March and increased from April to May and decreased on June and increased from June to October and decreased on November and December. The highest value of protein content during October (4.270%) and the lowest during June (3.205%). On the other hand the overall mean of protein contents were 3.607%.

(B): The relation of protein with fat for goat's, cow's and buffalo's milk.

1. Protein/fat ratio for goat's milk throughout the milking period:

Fat and protein gradually increased from May up to the end of lactation period. Also, this was positive correlation between fat and protein throughout the lactation period. While, the protein/fat ratio about 0.653367 all over the lactation period.

2. Protein/fat ratio for cow's milk throughout the milking period:

Fat and protein gradually increased from May up to the end of lactation period. Also, this was positive correlation between fat and protein throughout the lactation period. While, the protein/fat ratio about 0.653367 all over the lactation period.

3. Protein/fat ratio for buffalo's milk throughout the milking period:

Fat and protein gradually increased from May up to the end of lactation period. Also, these was positive correlation between fat and protein throughout the lactation period. While, the protein/fat ratio about 0.50666 all over the lactation period.

(C): The relation of protein with total solids for goat's, cow's and buffalo's milk.

1. Protein/TS ratio for goat's milk throughout the milking period:

Total solids and protein gradually increased from May up to the end of lactation period. Also, this was positive correlation between total solids and protein throughout the lactation period. While, the protein /total solids ratio about 0.256430 all over the lactation period.

2. Protein/TS ratio for cow's milk throughout the milking period:

Total solids and protein gradually increased from May up to the end of lactation period. Also, this was positive correlation between total solids and protein throughout the lactation period. While, the protein /total solids ratio about 0.256430 all over the lactation period.

3. Protein/TS ratio for buffalo's milk throughout the milking period:

Total solids and protein gradually increased from May up to the end of lactation period. Also, this was positive correlation between total solids and protein throughout the lactation period. While, the protein/total solids ratio about 0.233132 all over the lactation period.

Part (III):

1-Amino acid composition of casein from goat, cow and buffalo.

Free amino acid for goat's milk casein has a lower content of arginine, isoleucine and valine compared to casein of cow's milk but richer in histidine, alanine, glutamic and threonine . Casein of buffalo's milk is less in alanine, arginine, lysine, threonine and valine comparing to cow's milk. Goat's milk doesn't contain amino acid proline .

2- Major protein fractions of goat's, cow's and buffalo's milk

Total casein of goat, cow and buffalo milk was 2.51, 2.54 and 3.79, respectively. Goat milk casein has a lower content of α -s casein (0.65) compared to α -s casein of cow and buffalo milk (1.26 and 1.86). β -casein of goat milk has a higher content compared to cow milk, but β -casein of buffalo milk was higher than goat and cow milk.