



## Effect of lactation stage and calve sex in some of milk components in Iraqi Riverine Buffalo

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### Abstract:

The present study was carried out at local buffalo flock in AL-Najaf province , by using data collected for 40 riverine buffalo in different lactation stage thought the year 2013 to determine the effect of lactation stage and sex of birth in milk protein , lipids , lactose ,ash solid not fat ,calcium ,density, freezing point and water. Results was showed a significant effect ( $p \leq 0.05$  ) of lactation stage in milk lipids, protein, ash and freezing point , the highest values were in late period of lactation (9.5g/l ,4.0 g/l ,0.84 g/l and -29.85 c°) respectively. Lactose and density were increased significantly ( $p \leq 0.05$  ) in the beginning of lactation period its about 4.53 g/l and 54.33ml/gm respectively compared with end of lactation period its about 3.38 g/l and 43.67 ml/ gm respectively. S.N.F ,calcium and water were not affected significantly by lactation stage.

Significant effect ( $p \leq 0.05$  ) of calve sex in milk lipids, protein and freezing point , the highest values were in milk of dams that calved female (7.83g/l ,3.92 g/l and -27.36c°) respectively. Lactose and density were increased significantly ( $p \leq 0.05$  ) in the milk of dams that calved male its about 4.62 g/l and 53.17ml/gm respectively. S.N.F ,calcium, ash and water were not affected significantly by calve sex.

**Key words:** buffalo, lactation stage ,calve sex.

### Introduction:

The buffalo (*Bubalus bubalis*) is an important contributor to milk, meat, power, fuel and leather production in many developing countries. Buffaloes could be categorized into Asian and Mediterranean buffaloes. Asian buffalo have two subspecies known as the Riverine and Swamp types(1).

Global buffalo population is estimated to be 177 million. Out of which nearly 170 million are in Asia (more than 95%) and the remaining are found in Africa(3.92 million) and South America (1.3 million). Australia and Mediterranean countries also have significant buffalo population (2).In

Iraq buffalo population is estimated to be 130000 head in 2003.(3).

The buffalo milk a valuable nutrient with high content of milk protein (4.38%),fat (7.73%) ,lactose (4.79%) and mineral salts (0.8%).(4). The buffalo milk, due to its nutritional and economical value, has begun to gradually replace cow milk in different parts of the world. The buffalo population has registered an increase by 200%, from 88 million to 174 million during the period of 1961 – 2005, according to the statistical analyses made by (5) on a number of 42 countries. An increase in the demand of buffalo milk has

been registered also on the market because of its suitability in dairy product's processing.

Buffalo milk is a richer source of major and minor components which are essential to provide the nutritional requirements to human body. The compositional and characteristics differences from milk of other mammalian species depict that exiting technological or processing effects must be different.(6).

Many studies refers that the buffalo milk quality and components are influenced by breed or genotype (7). Management factors are also effect in milk quality such as nutrition(8).Calving season, year of birth and region.(9).In addition ,many studies refers that the milk composition is affected by many physiological factors such as dam weight and age, lactation stage, calve sex, parity and birth type. (10).

The major aim of this study is to provide valuable information on quality of buffalo milk and determine the effect of lactation stage as a physiological factor in milk composition such as total protein, fat content, lactose, ash , density ,freezing point and calcium to use this information as guidelines or indicators for the management strategies for buffalo under the farming conditions for selecting and improving the performance of domestic animals depending on this indicators.

### Materials and methods :

**Chemical analysis :** Milk samples were collected individually from 40 Iraqi reverine females buffalos different in lactations stage and the samples were analyzed in the same day .Ekomilk was used to measure of fat, solid not fat content (S.N.F) , total protein ,density and freezing point . Ash and calcium were also estimated in buffalo milk for all samples individually .

**Statistical analysis :** Data were analyzed using SAS .2000(11) computer program by

C.R.D design according to the following model :

$$Y_{ijkl} = \mu + t_i + e_{ijk}$$

Where:

$\mu$  : is an overall means .

$t_i$ : Effect of lactation stage ( early , mid and late).

$B_j$ : effect of calve sex(male – female

$e_{ijk}$  : is a random error.

Duncan multiple range test was used to determined the significant differences among treatments means (12).

### Results and discussions :

**Total lipids :** The concentrations of total lipids are increased significantly (  $p \leq 0.05$ ) in late lactation compared with early lactation it's about (6.2 and 9.5) g/L respectively .This increase in total lipids content may be due to the reason of fatty acids synthesizing enzymes particularly acetyl CoA carboxylase which is a regulatory enzyme in the fatty acid synthesis might have slightly increased in late lactation than early lactation (13) (14).

**Total protein :** Results presented in ( table -1) showed that a significant effect (  $p \leq 0.05$ ) of lactation stage total protein content. The lower value was in the beginning of lactation stage it's about 3.31g/L compared with the end of lactation stage it's about 4.19g/L. This results due to positive and high correlations between total lipids and total protein in buffalo milk therefore they increased in the same direction .

The maximum concentration of lactose is observed during early lactation was 4.53 g/Land decrease significantly to 3.38 g/L in late lactation. This results it's accordance with the results of (15) who reported that lactose concentration remained invariable from 1st week to fifth week and slight decrease was observed during the last two weeks of lactation period .

Ash of buffalo milk increased significantly (  $p \leq 0.05$ ) in the end of lactation stage compared with the beginning of lactation

stage ,the values were (0.84 and 0.71)g/L respectively. Calcium value was increased significantly (  $p \leq 0.05$ ) in the beginning of lactation compared with the mid of

lactation its about (0.962 and 0.107)g/l respectively. This results are in good agreement to those of (14).

**Table:** Effect of lactation stage in some buffalo milk components.

Lactation stage			
	(Early ) 1 -3 month after calving	(Mid ) 4- 6 month after calving	(Late) 7-9 month after calving
Total lipids g/l	6.23 $\pm$ 1.21 a	7.10 $\pm$ 1.18 a	9.5 $\pm$ 1.82 b
Total protein g/l	3.31 $\pm$ 0.87 a	3.80 $\pm$ 0.62 a	4.19 $\pm$ 0.66 b
Lactose g/l	4.53 $\pm$ 0.93 a	4.05 $\pm$ 0.95 a	3.38 $\pm$ 0.83 b
S.N.F g/l	9.2 $\pm$ 1.79 a	9.11 $\pm$ 2.14 a	9.0 $\pm$ 2.61 a
Calcium g/l	0.962 $\pm$ 0.08 a	0.107 $\pm$ 0.010 b	0.115 $\pm$ 0.03 b
Ash g/l	0.71 $\pm$ 0.03 a	0.80 $\pm$ 0.022 b	0.84 $\pm$ 0.077 c
Density ml/gm	54.33 $\pm$ 4.15 a	50.71 $\pm$ 5.20 b	43.67 $\pm$ 3.89 c
Freezing point - c°	30.80 $\pm$ 4.26 a	29.24 $\pm$ 3.79 a	26.85 $\pm$ 4.11 b
Water %	81.93 $\pm$ 4.19 a	82.01 $\pm$ 4.15 a	82.41 $\pm$ 5.22 a

**Different letters in the same column for each factor means a significant difference (  $p \leq 0.05$ ) .  $\pm$ : S.E**

Solid not fat content(S.N.F) was unchanged significantly(  $p > 0.05$ ) thought the lactation period. this result similar with results of (16) who reported the effect of stage of lactation on trends in S.N.F. and total solids contents 1st and 10 month of lactation.

Density was decreased significantly(  $p \leq 0.05$ ) in progress of lactation period ,its about 54.33 m/gm in early stage compared with 43.67 m/gm in late stage this results because of the increase of milk quantity in late period of lactation and the negative

correlation between density and milk production .This results are similar with the result of (17) who refer that negative correlation between density and milk total fat .

freezing point was decreased significantly(  $p \leq 0.05$ ) in early lactation compared with late lactation ,its about -30.8c° and -26.41c° respectively .This result accordance with the study of (18) who reported that freezing point is affected by lactation stage.

**Effect of calve sex in milk components in buffalo milk**

Calve sex		
Milk contents	Male	Female
Total lipids g/l	6.72 $\pm$ 1.07 a	7.38 $\pm$ 1.66 b
Total protein g/l	2.17 $\pm$ 0.49 a	3.92 $\pm$ 0.53 b
Lactose g/l	4.62 $\pm$ 0.75 a	3.41 $\pm$ 0.37 b
S.N.F g/l	9.40 $\pm$ 1.38 a	9.16 $\pm$ 1.93 a
Calcium g/l	0.874 $\pm$ 0.09 a	0.933 $\pm$ 0.014 a
Ash g/l	0.74 $\pm$ 0.06 a	0.77 $\pm$ 0.041 a
Density ml/gm	53.17 $\pm$ 2.31 a	50.24 $\pm$ 3.88 b
Freezing point -c°	31.10 $\pm$ 4.15 a	27.36 $\pm$ 4.19 b
Water%	83.11 $\pm$ 2.68 a	82.34 $\pm$ 3.15 a

**Different letters in the same column for each factor means a significant difference (  $p \leq 0.05$ ).  $\pm$ : S.E**

Results show significant effects(  $p \leq 0.05$ ) of calve sex in some of milk contents .Total lipids were increased significantly in dams milk that calved female compared with dams that calved males its about (7.38 and 6.72) g/l respectively .In addition total protein increased significantly (  $p \leq 0.05$ ) in the milk of dams that gave female calves its about (3.92 )g/l compared with dams that gave male calves its about 3.17g/l .Lactose increased significantly (  $p \leq 0.05$ ) ) milk of dams with male calves (4.62 g/l) ,while milk of dams with female calves gave 3.41g/l and this results is partially agree with (19) and (9) . This result is similar with the result of (20) who found that lactose percent in buffalo milk is average between (2.95 to 4.79 ) % .Ash ,calcium and S.N.F were not affected significantly by calve sex while density increased significantly(  $p \leq 0.05$ ) in the milk of dams that calved male .Significant increase (  $p \leq 0.05$ ) in milk freezing point of dams that calved female compared with dams that calved male its about(-27.36 and - 31.10) $^{\circ}\text{C}$  respectively. Significant increase (  $p \leq 0.05$  ) in milk density of male calves compared with milk density of female calves its about (53.17 and 50.24) ml/gm respectively. This result agree with (10) and (14).Lactation stage and calve sex were not effect significantly( $p > 0.05$ ) in water milk percent.

### Conclusion:

The current study showed that the milk yield is correlated either positively with protein , fat and ash or negatively with lactose content and density. As milk yield changes according to many factors such as lactation stage and sex of birth ,therefore the wide variation in milk components can be happened and we can see that the performance of females changed due to many factors were affected essentially by milk yield like sex of birth and lactation of stage.

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