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Fifth YEAR-Class of Milk Hygiene

Factors affecting milk composition

In last decades, milk has become an essential food production to human consumption and economically important. It has natural resources of different elements, on average that contains 3.6 percent fat, 3.2 percent protein, and 4.7 percent lactose. It seems there is a variation in the fat content of milk that accompanied by changes in the same direction in the solid non-fat (SNF) content but at lower rate. If the fat increased by 1% in the milk, around 0.4% of other elements (SNF) will be increased.

- There are 13 factors that could influence or affecting on milk composition:

1- Species of animals

The following table shows the composition of the milk of different animal species.

<i>Species</i>	<i>Fat</i>	<i>Protein</i>	<i>Lactose</i>	<i>Ash</i>
Cow (Bos taurus)				
-Holstein	3.5	3.1	4.9	0.7
-Jersey	5.5	3.9	4.9	0.7
Buffalo (water)	7.4	3.8	4.8	0.8
Camel	3.9	3.2	4.6	0.7
Sheep	7.2	4.6	4.8	0.9
Goat	4.5	3.2	4.3	0.8
Horse	1.9	2.5	6.2	0.5
Sow	6.8	4.8	5.5	1.0
Rabbit	15.3	13.9	2.1	1.8

2- Variation among breeds

The quantity of the milks produced, and its compositions depends on the type of animal breeds.

The table below represents variation of the milk composition produced by different cattle breeds.

. Milk composition of five breeds of dairy cattle.

Breed	Total solids	Fat	Protein	Lactose	Ash
Ayrshire	12.69	3.97	3.26	4.63	0.72
Brown Swiss	12.69	3.80	3.18	4.80	0.72
Guernsey	13.69	4.58	3.49	4.78	0.75
Holstein	11.91	3.56	3.02	4.61	0.3
Jersey	14.15	4.97	3.03	4.70	0.77

3- Variation among individuals of animals

Milk of individual cows with a given breed may show considerable variation in fat percentage of milk (higher or lower fat%), even when conditions of management and environment. Inheritance or genetic factors are may be responsible of these differences.

4- Feeding

A proper feeding programme tend to increase the amount of milk production. Feeding appropriate non-fiber carbohydrate levels (starch, sugars and pectin) can improve both milk fat and protein levels, while overfeeding leads to milk fat depression of one unit or more and often increases milk protein percent by 0.2 to 0.3 unit.

5- Age of cow at calving

It is well known that cows produce more milk as they become older (increase milk production with age). larger cows characterised by having more udder secretory tissue and digestive systems. Cows of most breed are considered mature at 6-year-old beyond which milk production remain fairly constant for three lactations and gradually declined the subsequent period. When cow are 8 or 9 years of age a slight reduction in the level of milk production occurs.

6- Lactation period

The cow reaches her peak of production approximately six weeks after parturition and then a gradual decline in the yield. There is a general inverse relationship between milk yield and fat percentage. As the yield increase the percentage of milk fat decrease.

7- Efficiency of milking or of the milker

Complete evacuation of milk is necessary because the first draw milk or fore milk may be as low as 1% milk fat whereas the last draw milk may be as high as 9% milk fat. The milk yield at the next milking is higher in milk fat content since it contains the leftover milk from the last milking with a high fat content and the normal yield and fat from the present milking.

8-Interval between milking

Milking of cows at equal intervals produces milking that has a slight variation in fat test (10-12hr). Milk yield is almost higher after a long interval which tend to compensate for the lower fat test as there is a general inverse relationship between milk yield and fat test. The milk fat test may vary as much as 1% between the night and morning milking when cows are milked at 14- and 10-hours intervals.

9- Seasonal Variations

Seasonal variations in milk composition are commonly observed with dairy cattle in temperate regions. In general, milk fat and solid-not-fat percentages are highest in winter and lowest in summer. Milk fat and protein percentages are lower by 0.2-0.4% in summer than winter. So, fat and other milk composition affect significantly by the temperature.

10-Diseases

Although other diseases can affect milk component content and distribution, mastitis has been the predominant disease studied. Mastitis results in a reduction in fat and casein content and an increase in whey content of milk. These changes in the milk proteins, in conjunction with alterations in lactose, mineral content and milk pH, result in lower cheese yields and altered manufacturing properties. Milk from cows with elevated somatic cell counts (greater than 500,000 somatic cells/ml) has longer coagulation time and forms weaker curds than milk from cows with lower somatic cell counts.

11- Gestation

The rate of decline in milk yield is starting at the twenty second week of pregnancy which occurs at approximately the seventh to eighth month of the normal lactation curve if the cow is bred back 60 days after calving and marked drop in milk production occurs toward the end of pregnancy stage. This may be due to change to hormonal condition or level.

12- Body condition at calving

Cow must be in a great condition at calving to increase peak milk production. Cow having a thin body condition at the end of lactation require a dry period to replenish their supplies. Whereas a cow with a good condition at calving also have a slightly higher milk fat percentage those in poor condition.

13- Length of dry period

Dry period is the period before calving that cow are not milked which about 6-8 weeks (approximately 60 days). A dry period longer than 60 days does not improve yield in the next lactation. Cows with dry period of 40 days had slightly less production in the next lactation. The dry period is useful for treatment cows with antibiotics in case of persistent subclinical mastitis, to allow the cow a rest period before birth of the next calf and to maximise milk yield in the next lactation.