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Relationship between different milk constituents of GIR cow

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Abstract
The present study was carried out in the herd of Gir cow and aim of the study is to find out relationship between milk constituents. The overall least square means for test day milk yield, fat percentage, solid not fat, protein percentage, lactose percentage total solids percentage were found to be 5.290 ± 0.081 kg per day, 4.399 ± 0.018, 8.632 ± 0.021 percent, 3.173 ± 0.011 percent, 4.582 ± 0.015 percent and 13.031 ± 0.028. Highly significant and positive correlation was observed between fat and total solid (0.762), fat and solid not fat (0.241) fat and protein (0.094) and fat and lactose (0.203). Highly significant and positive correlations were concluded between fat, solid not fat, lactose and total solids content of the milk. This may be indicates that selection of one milk constituents will bring improvement in other milk constituents also in Gir cow.

Keywords: Correlation, milk, GIR, fat, solid not fat

Introduction
The Gir cow is one of the principal zebu breed s originating in India and is known as milch breed of dairy cow. The home tract of this breed is in the Saurashtra region of Gujrat State [3]. Milk is an important source of nutrient such as protein, minerals and vitamins in the human diet. In dairy industries, composition of milk is important which also effect the product quality and quantity and price of product. Dairy production can be enhanced by improving the genetic potential of the animal. The genetic and non genetic factor related to milk constituent is scanty in Chhattisgarh. It become necessary to find out relationship between various genetic and non genetic factors that determining the magnitude of variation in the milk constituents like fat, solid-not-fat, protein, lactose, total solids percentage as well as their yields at the successive stage of lactation and in a complete lactation. The correlation is a way to measure the relationship between any two traits and provides us the nature and degree of association among yield and yield contributing traits. These associations help us to perform indirect selection for better yielding genotypes [10]. This will furnish criteria for choice, rearing and breeding of animals by dairy farmers to marketing requirements. Therefore it is necessary to assess the relative importance of various factors determining the magnitude of relationship in between the milk constituent like fat, solid not fat, protein, total solids and lactose.

Materials and Methods
The present study was carried out in the herd of Gir cow maintained at SRT AGRO SCIENCE PVT. LTD., Village-Funda, Block-Patan, District-Durg, (C.G) located at distance of 40 km from College of Veterinary Science and Animal Husbandry Anjora, District Durg (C.G.).The climate is light tropical, sub-humid with a seasonal variation in temperature and rain fall. The number of animals used was 42 during whole study period. Laboratory analysis was taken by milkotester (milk analyzing device, model LM2), instrument used for determination of fat, solid not fat, Protein, Lactose and freezing point of milk. The fresh milk sample was collected separately in morning and evening. On each collection day aliquots of morning and evening milking was sampled from each cow in proportional to the amount produced and was mixed thoroughly. The mixed sample was analyzed for estimation of fat, solid not fat, protein and lactose. Test day milk yield was recorded for cows under study. Individual mean comparisons were made for the significant analysis and Coefficient of correlation among different milk constituents and with test day milk yield were determined by the formulae as described by [9].

Results and Discussion

The overall least square mean for test day milk yield, fat percentage, solid not fat, protein percentage, lactose percentage total solids percentage was found to be 5.290 ± 0.081 kg per day, 4.399 ± 0.018, 8.632 ± 0.021 percent, 3.173 ± 0.011 percent, 4.582 ± 0.015 percent and 13.031 ± 0.028. The present findings are closely related with the result obtained by [4]. Most of the available reports on milk fat percentage of indigenous cows showed the average fat content ranging 3.31 to 6.13 percent in different breeds of indigenous cows.

Interrelationship between test day milk yield and with major milk constituents and among the constituents been is presented in Table 1. Interrelationship between test day milk yield with major milk constituents and amongst the constituents has been worked out. In the present study negative and significant correlation were observed between test day milk yields with fat and TS. Similar findings were also observed by [1, 8]. This may indicate that selection for high milk yield may results in reduction in fat and total solid percentage of milk in Gir cow.

Table 1: Overall Means of Test day milk yield (TDMY) and different milk constituents (%)

Parameters	Mean ± S.E.	Std. Deviation	95% Confidence Interval	
			Lower Bound	Upper Bound
TDMY	5.290±0.081	2.926	5.130	5.449
Fat	4.399±0.018	0.650	4.364	4.434
solid not fat	8.632±0.021	0.758	8.591	8.673
Protein	3.173±0.011	0.397	3.151	3.195
Lactose	4.582±0.015	0.542	4.552	4.612
Total Solids	13.031±0.028	1.011	12.976	13.086

The correlation between test day milk with, solid not fat, protein and lactose were found to be negative and non significant. These values were not different from zero. Similar findings were also observed by [7]. Highly significant and positive correlation was observed between fat and TS (0.762), fat and solid not fat (0.241) fat and protein (0.094) and fat and lactose (0.203). However, positive correlation between fat and protein were reported by [2, 7]. These correlations suggest that as the fat increased, there were tendency for, total solids, solid not fat, protein and lactose to increase. Thus selection for fat will automatically bring improvement in TS, solid not fat, protein and lactose contents of milk in Gir cows. The correlations between total solids with protein, solid not fat and lactose were positive and significant which is obvious because protein, solid not fat and lactose are the part of total solids. This indicates that selection for total solids will naturally bring improvement in the protein and lactose content of milk in Gir cows. Correlation between solid not fat with protein and lactose were found to be positive and non-significant. Correlation between protein and lactose was found to be positive and non significant which was in contrary to above finding [6, 7]. Since milk fat is a more important trait both in respect of milk pricing and manufacturing of dairy products. Hence it is essential to incorporate fat yield in the selection procedure of any breeding plan. It is also suggested that selection should be done on the basis of both fat and milk yield to take care of milk yield and its constituents.

Table 2: Correlations between test day milk yield and different milk constituents

	TDMY	Fat	solid not fat	Protein	Lactose	Total Solids
TDMY		-0.144**	-0.063^{NS}	-0.049^{NS}	-0.011^{NS}	-0.129**
Fat			0.241**	0.094*	0.203**	0.762**
solid not fat				0.070^{NS}	0.189**	0.812**
Protein					0.006^{NS}	0.103**
Lactose						0.248**
Total Solids						

** Significant at $P<0.01$ * Significant at $P<0.05$ NS = Not Significant

Conclusion

Highly significant and negative correlation obtained between test day milk yield with fat and total solids content of milk. Highly significant and positive correlations were concluded between fat, solid not fat, lactose and total solids content of the milk. Different milk constituent also give important emphasis for improvement of breed through selection positive and negative correlation of milk constituent.

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