



## ORIGINAL ARTICLE

# Hybrid Selection Based on Genetics, Milk Production And Reproductive Capabilities

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### ABSTRACT

*It was found that Azzebu (*Bos indicus* or *Bos taurus indicus*) could be used to breed hybrid cattle Based on the conducted researches and this raises the peripheral resistance, reproduction and milk production livestock. It was proved, based on the analysis of the study data, that hybrid milk production, milk protein and daily weight gain resulting from cross-breeding with Azzebu, Qafqaz, Qonur, Qara ala and Qonur latviya showed a significant increase compared to the Azzebu. According to the data analysis, it becomes clear in the third lactation that hybrids, resulted from cross-breeding (Qara ala × Azzebu) with 2185 kg within a lactation period, produced more milk than the other groups and also produced more fatty and protein milk. Further investigation revealed that lactating rates and daily weight gain are correlated. It should be noted that these comparisons are analyzed based on 100 kg live body weight of the livestock. We can say according to our data experiences that Qonur latviya data and Qara ala hybrids, per 100 kg live weight, produced more milk. We should use an improved breed for cross-breeding to be fruitful and economically-profitable. If we are going to raise Azzebu reproduction, disease resistance and milk fat.*

*Keywords: hybrid, Zebu breed, reproduction*

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### INTRODUCTION

The most important issue in the modern market economy is to meet the food needs of the people. So, it is important to breed resistant livestock which is adapted to the environmental conditions and is of rapid growth, longevity and high milk production. The most important needs are to produce milk and meat. Achieving this goal, it is important to breed a hybrid specie. From the Biology view point, we raise livestock capability through selection and improvement and produce more crops. Thus meet the food needs of the population. Humped cow, Zebu, breed has been recently joined the livestock population. Enjoying the specific genetic characteristics, this cow is different from other livestock from the view point of biology and profitability. Qara ala and zebu cows are cross-bred in early conditions to produce a hybrid that is resistant to environmental conditions accompanied by higher lactation and proper growth and is genetically strong and superior compared to other livestock [1-5]. Stronger and lighter bones, resistant hooves, resistant to infection, blood disease resistant, low expectations in terms of food requirements and compatibility with the environment are some of the general characteristics of zebu cattle. In recent years, hybrids derived from Zebu breed are obtained with a higher record in countries such as America, Africa, Australia [1-5], Brazil and India. As a sample, a 12 month Mondolong breed produced 533 kg of meat and milk in a cattle in Brazil which are based on Zebu breed and it is approximately 10-12 tons. The world's largest record for milk production in Kartaxena dairy from Siboney breed took place in Cuba. The hybrid cow has a white breast and the milk produced during 3 lactation periods amount to 27,674 kg milk and 3.8 % milk fat respectively and produces an average of 75.8 kg milk per day and the highest production rate reached to 110.9 kg. There has been long time importing high milk producing cows like Holeshtin, friz, Gara ala in different countries to where the cows need more food and are adapted to harsh climatic conditions and were easily infected and get sick. If we take a look at the livestock husbandries in developed countries such as USA, New Zealand, Brazil, Argentina, Australia, Cuba and etc. These countries clearly specify that they must breed cows with higher milk and meat production, longevity, resistance to disease and adapting quickly to the related environment. To this end, breeds are obtained for those conditions which all derived from zebu breed. As it is clear if we increase production for each

animal by 1000 kg, this process takes us 40-50 years to be achieved, but it takes 10-15 years to reach the same production through hybridization. We require 30-40 years in an usual breeding to achieve a special breed. But, the same breed can be obtained through hybridization within 20-25 years' time [1, 6-14].

## MATERIALS AND METHODS

Based on the results of studies and research conducted across the world, it was proved that a short period of time is required to breed dairy and beef breeds through hybridization. The research objective is to produce and breed economically-profitable livestock based on hybridization with higher reproductive capability, resistant to extreme environmental conditions, rapid growth and resistant to breast diseases. Hybrids of Southern areas are stronger than Gara ala and Qonur latviya in terms of mastitis disease. This is why the creation of hybrid dairy breeds is under investigation. The researches were primarily conducted in the area of Astara in Narimanov and Komsomol husbandries. In these husbandries, the hybrid livestock were used for increasing production by using Azerbaijan zebu breed and Qara ala, Qonur latviya and Qafqaz Qonuru bulls. Advantages of obtained hybrids are different from their parents and characteristics like producing milk in different periods of lactation, milk quality, weight gain, calving interval, giving birth to a calf, live calving and fast growing calves were taken into consideration that obtained results were statistically analyzed.

## RESULTS

Research results show that Appearance and photopia properties dominantly passed from parents to Azerbaijan zebu which it shows itself in skin and hair color, white jowl and humps. Researches show that zebu breed is of high calving process and the first successful gestation rate is higher than the one in black cows. Dystocia rate in zebu cow and hybrids were lower than modern breeds and there was no sign of disease after birth and placenta dropped faster and easier after birth than black cows. Also, uterus restored more easily and is ready to reproduction again, resulting in estrous female sexual organs and soon appears to be leading to insemination and pregnancy. The service period and calving interval for such cows, are short. The reproductive function of Zebu and hybrids are higher than black cows during estrous if the nutrition and keeping conditions are normal. Fertilization rate and amount of such follicles released in Zebu breed and its hybrids during estrous are higher than black cows. In most of the Zebu breeds and its hybrid, results in twin birth during 2 or 3 Births. This increases the meat production leading to more profits research shows the temperature difference has no impact on the fertility rates in Qara ala cows. This can be seen in Zebu too. The temperature difference does not decrease the fertility rate and the reproduction capability of zebu hybrids reacts physiologically to warm and cold weathers. For example: the black cow temperature increases at a temperature of 30 degrees Celsius. But, the temperature for Zebu breed does not increase at the same temperature. It means that zebu breeds can keep their body temperature at normal degrees. The results of the study are recorded in the following tables

Table 1- Milk production of cows after first birth

Group of Cow breeds		Milk (Kg)	Milk fat	Milk fat	Milk protein	Milk protein	Milk fat & protein /Gram
			%	Kg	rate	rate	
						kg	
Az. Zebu		1050±23.5	5.8	60.9±5.4	4.5	47.25±3.6	108.2
Zebu * Brown	Fact	1905±22.8	4.30	84.3±8.3	3.8	72.39±4.1	156.7
Latvia	Az.zebu Yanis %	158.7	74.1	138.4	84.4	153.2	144.8
* Black get zebu	Fact	2050±48	4.2	86.1±6.5	3.6	73.80±5.8	159.9
	Az.zebu Yanis %	195.2	72.4	141.3	80	156.2	147.8
* Caucasian	fact	1697±53.7	4.32	73.4±5.5	3.5	59.4±4.3	132.8
Brown zebu	Az.zebu Yanis %	161.6	74	120.5	77.7	125.8	122.2

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**Table 2 – Milk production of cows after second birth**

Group of Cow breeds		Milk (Kg)	Milk fat	Milk fat	Milk protein	Milk protein	Milk fat & protein /Gram
			%	Kg	%	kg	
Az. Zebu		1180±29.6	5.75	67.85±7.0	4.3	50.7±4.6	118.6
Zebu * Brown Latvia	Fact	2357±39.5	4.25	100.2±5.8	3.65	86.0±5.1	186.2
	Az.zebu Yanis %	199.7	73.9	147.7	84.9	169.6	159.9
* Black get zebu	Fact	2460±38.8	4.2	103.3±5.6	3.55	87.3±4.7	190.6
	Az.zebu Yanis %	208.5	73.0	152.2	82.6	172.2	160.7
* Caucasian Brown zebu	fact	1960±28.9	4.3	84.3±4.6	3.35	65.7±3.9	150.0
	Az.zebu Yanis %	166.1	74.7	124.2	77.9	129.6	126.5

**Table 3- Milk production of cows after third birth**

Group of Cow breeds		Milk (Kg)	Milk fat	Milk fat	Milk protein	Milk protein	Milk fat & protein /Gram
			%	Kg	%	kg	
Az. Zebu		1240±23.8	5.65	70.1±4.9	4.2	52.1±4.4	12.2
Zebu * Brown Latvia	Fact	2640±45.8	3.5	110.9±5.5	3.5	92.4±4.9	20.3
	Az.zebu Yanis %	212.9	74.3	158.3	83.3	177.4	166.4
* Black get zebu	Fact	2710±44.3	4.15	112.5±5.9	3.45	93.5±5.1	206.0
	Az.zebu Yanis %	218.5	73.5	160.5	82.1	79.5	168.6
* Caucasian Brown zebu	fact	2120±43.6	4.2	89.0±3.7	3.2	67.8±3.2	159.8
	Az.zebu Yanis %	170.9	74.3	126.9	76.2	130.1	128.3

**Table 4- A relationship between live weight and milk production rate**

Group of Cow breeds		Live weight during 1 <sup>st</sup> lactation	Live weight during 2 <sup>nd</sup> lactation	Live weight during 3 <sup>rd</sup> lactation	Milk production during 1 <sup>st</sup> lactation	Milk production during 2 <sup>nd</sup> lactation	Milk production during 3 <sup>rd</sup> lactation
Az. Zebu		118.9	118.3	120.5	152.8	160.0	187.7
* Black get AzZebu	Fact	332	348	360	617	683	783
	Az.zebu Yanis %	139	124.7	125.4	155.8	161.5	181.3
* Caucasian Brown AzZebu	fakt	302	315	327	562	622	363
	Az.zebu Yanis %	139	112.9	113.9	141.9	147.0	199.8
The average rate of Latvia Brown, Black, pick up, Brown Caucasus		332	347	361	795	820	390
The average Hybrids	Fact	316	331	345	595	660	815
	Az.zebu nis %	119.2	118.6	120.2	150.3	155.2	188.7

Table 5 – First lactation period

Observing periods	Az.Zebu	* Brown Latvia Azzebu	* Black get Azzebu	* Caucasian Brown AZzebu
1 <sup>st</sup> birth in months	35.5±0.5	34.5±0.45	32.8±0.4	35.5±0.5
Days of gestation	288±0.5	285±0.5	284.5±0.6	288±0.5
No of services (days)	135±4.4	130±4.3	121.5±4.6	135±4.4
Two Gestation Intervals	440±9.5	415±9.2	406±7.8	440±9.5
Level of Cows	18.5	16.5	14.5	18.5
Stillbirth(%)	2.1	2.4	1.5	2.1
Abortion(%)				
Gestation Interval	31	33	46	31
Milk protein & fat /Gram	82	89	89.9	82

Table 6- Second Lactation period

Observing periods	Az.Zebu	* Brown Latvia Azzebu	* Black get Azzebu	* Caucasian Brown AZzebu
1 <sup>st</sup> birth to months	50.5±0.7	48.3±0.45	46.1±0.4	46.5±0.5
Days of gestation	288±0.5	284±0.5	285.5±0.6	284.2±0.5
Two Gestation Intervals	129±4.5	124±4.5	113±3.8	115.3±3.8
Level of Cows	431±9.2	408±8.05	398±8.3	399.7±8.4
Stillbirth(%)	14.5	14.0	9.7	13.77
Abortion(%)	1.9	1.8	1.1	1.9
Gestation Interval	34	36	50	40.7
Milk protein & fat /Gram	87.5	89.5	91.7	91.4

Table 7-Third Lactation Period

Observing periods	Az.Zebu	* Brown Latvia Azzebu	* Black get Azzebu	* Caucasian Brown AZzebu
1 <sup>st</sup> birth to months	64.5±0.5	61.9±0.45	60.4±0.4	61.1±0.4
Days of Gestation	287±0.5	285±0.5	284.5±0.6	284.6±0.5
Two Gestation Intervals	117±3.9	110.0±3.9	110.5±3.6	106.2±3.5
Level of Cows	418±7.9	395±7.8	396±7.5	391±7.5
Stillbirth(%)	11.5	12.3	7.0	11.0
Abortion(%)	1.1	½	0.4	½
Gestation Interval	38	40	47	42.4
Milk protein & fat /Gram	89	92.4	92.2	93.4

If we analyze the data included in Table7 based on lactation periods, It is clear that Az. Zebu breed is low in milk production comparing to hybrids that their milk production reached 400-600 kg. Different periods of lactation, protein and fat milk are higher among the hybrids derived from Qara ala × zebu cross-breeding. So that , the first ,second and third lactations reached 159.9 kg, 190.6 kg and 206 kg respectively and 76 kg milk produced rather than the Zebu mother . Abortions and stillbirths among the hybrids can be rarely seen and milk production increased from 41.5 % to 52.5 % compared to Az.zebu breed .

## DISCUSSION

Zebu raising and blood combined with other breeds are more common in developed countries and its resistance against harsh environmental conditions is the most important reason for it . Note that the use of modern breeds like Holeshtin friz, Gara ala, Simmental is too costly. , so using these breeds for this purpose is baseless and inept. For more profits, it is advisable to use a mixed livestock of Zebu cows and,

subsequently, breed a cow with higher milk production. It should be noted that Zebu breed and inbred livestock of this breed are deemed as the environmental livestock. Because, The people's need for the meat would be met and state and private industrial-owned livestock farmers have to care for their animals through using the best production methods. Research shows that there are 1.3 billion cows in the world to which 50% are of zebu breed [15-18].

We can pose it this way in accordance with the research results that the average milk production of zebu cows in Azerbaijan was 1050 Kg during the first lactation. But, the milk production of hybrids derived from Qonur Latviya and Zebu reached 1905 kg. It is said that the rate of milk production by hybrids derived from Zebu and Qara Ala was higher than the three groups in our research. Because, the Qara Ala cows are of dairy breed and increased the milk production rate and the hybrid milk fat was higher than their parents. The data analysis of milk production among the second gestation cows made it clear that Zebu contribution in cross-breeding increased the milk production rate because these breeds are more environmentally adapted to their living conditions. The milk production rate of Zebu breed was 1050 Kg during the first lactation. But, this rate reached 1180 Kg during the second lactation namely there was 130 kg increase in milk production. While at the same time Qonur Latviya and Qara Ala on average produced milk increasingly 350 and 390- kg respectively. As can be seen in Table 3, The weight gain among the livestock groups resulted in increased milk production rate. This correlation between live weight and increased milk production can be seen during the different gestation periods. So, the first and second gestation periods increased roughly the quality and quantity of milk. When the amount of milk production are compared together. The results would be that there is a relationship between live weight and milk production [18-25].

Analyzing the data pertaining to the table 4, It is clear that live weight and milk production are increased together during different gestation periods and this influenced the milk production rate as well. There was an average milk production of 396 and 432kg for Zebu breed during the first and third lactations respectively. This shows that changes in live weight and milk production rate are directly related. A high proportion of lactating among zebu breed and its hybrids showing how consistent they are has.

## REFERENCES

1. Esteghamat, O. 2010 Hematological factors of Azeri Zebu (*Bos primigenius indicus* or *Bos indicus*) and its relation with Zebu hybridization efficiency. *Annals of Biological Research*, 1 (4): 158-160.
2. Acharya, R.M. (1987). Experience of crossbreeding in India. Page 27 in *Dairy India 1987*. 3rd ed. P.R. Gupta, ed. Priyadarshini Vihar, Delhi, India.
3. Alba, J. de & Kennedy, B.W. 1985. Milk production in the Latin American Milking Criollo and its crosses with the Jersey. *Anim. Prod.* 41, 143-150.
4. Berenguer, F., 1984. European and zebu breeds and their crosses for milk production in the wet tropics of Mexico. In *Milk Production in Developing Countries* (Proceedings of the Conference held in Edinburgh from the 2nd to 6th April, 1984). Poster session 4.3. 2 pp.
5. Bhattacharya, S. & Guha, H. 1966. Improving milk production by cross-breeding dairy cattle, Haringhata (PL 480 Project). Paper presented at Seminar on animal breeding, Calcutta, 11 December, 1966. Mimeographed, 10 pp.
6. Chacko, C.T. 1983. Crossbreeding to increase the milk production of local cattle of Kerala (India). XVth International Congress of Genetics, New Delhi, Dec. 12-21, 1983, I, p. 29.
7. Hernandez, A. (2011). Estimation of genetic parameters and phenotypic and genetic trends of the calving interval in the mambi de Cuba cattle and its relation with the milk yield. *Cuban journal of agricultural science*, 45: 1.
8. Donovan, P.B. (1978), fattening studies with cross-bred (European × zebu) bulls; 1. performance on diets of native hay and concentrate. *Journal of Agricultural Science*, 90: 425-429.
9. Kanchan, D.K. & Tomar, N.S. (1984). The economics of cattle and buffalo breeding for milk production. *Indian Veterinary Journal*, 61, 1044-1049.
10. Madalena, F.E., Teodoro, R.L., Lemos, A.M., Monteiro, J.B.N. & Barbosa, R.T. (1990). Evaluation of strategies for crossbreeding dairy cattle in Brazil. *Journal of Dairy Science*, 73, 1887-1901.
11. Martinez, M.L., Lee, A.J. & Lin, C.Y. (1988). Age and Zebu-Holstein additive and heterotic effects on lactation performance and reproduction in Brazil. *J. Dairy Sci.*, 71 (3), 800-808.
12. Mc Dowell, R.E. (1972). Improvement of livestock production in warm climates. San Francisco, USA; W.H. Freeman and Company. 711pp.
13. Madalena F.E. (1981). Crossbreeding strategies for dairy cattle in Brazil. *World Anim. Rev.* 38, 23-30.
14. Nair, P.N.R. 1973. Evolutionary crossbreeding as a basis for cattle development in Kerala state (India). Thesis, University of Zurich, Faculty of Veterinary Medicine. Quoted by Katpatal, 1977.
15. Menzi, M., Kropf, W. & von Siebenthal, W. 1982. An exotic cattle population under a tropical environment. *Wld Anim. Rev.* 44, 24-29.
16. Madalena, F.E., Lemos, A.M., Teodoro, R.L. & Barbosa, R.T. (1982). Preliminary results on the comparative dairy performance of six Holstein-Friesian: Guzera grades in Brazil. 2nd World Congress of Genetics Applied to Livestock Production, Madrid Oct. 4-8, VIII, 218-223.

17. Nagarcenkar, R. 1982. Breeding for dairy production in the tropics. 2nd. World Congress on Genetics Applied to Livestock Production, Madrid Oct. 4 to 8, V, 414-438.
18. Nagarcenkar, R. & Rao, M.K. 1982. Performance of Tharparkar-exotic crosses for productive and reproductive traits. *Indian J. Anim. Sci.* 52 (3), 129-138.
19. Parmar, O.S. Dev, D.S. & Dhar, N.L. 1980. Inter-se mating among Jersey and Harijana cattle. *Indian J. Dairy Sci.* 33 (4), 465-467.
20. Prada, N. 1979. Dairy crossbreeding programme in Cuba. (Translated title). Paper presented at Colloquium on crossbreeding of dairy cattle in the tropics: Value of crossbreeding in different production systems, Havana, Cuba, Sept. 23 to 29, In *Memoria Asociacion Latinamericana de Produccion Animal* 14, 163-167
21. Reaves, C.W., Wilcox, C.J., Salazar, J.M. & Adkinson, R.W. 1985. Factors affecting productive and reproductive performance of cows in El Salvador. *J. Dairy Sci.* 68(11), 3104-3109.
22. Taneja, V.K. & Chawla, D.S. 1978 a. Comparative study of economic traits of Brown Swiss × Zebu crossbreds. *Indian J. Dairy Sci.* 31 (2), 188-190.
23. Vaccaro, L.P. de 1979. The performance of dairy cattle breeds in tropical Latin America and programmes for their improvement. Working Paper FAO/GOI Expert Consultation, Hissar, India, Febr. 12 to 17, 1979. In *Dairy Cattle Breeding in the Humid Tropics* (ed. D.S. Balaine), p. 121-132. Haryana Agricultural University, Hissar
24. Vaccaro, L.P. de 1973. Some aspects of the performance of European purebred and crossbred dairy cattle in the tropics. Part I: Reproductive efficiency in females. *Anim. Breed. Abstr.* 41, 571-589.
25. Vaccaro, L.P. de (1974). Some aspects of the performance of European purebred and crossbred dairy cattle in the tropics. Part II: Mortality and culling rates. *Anim. Breed. Abstr.* 42, 93-103

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