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THE EFFECT OF GRADING UP BALADI CATTLE WITH FRIESIAN ON MEAT PRODUCTION PERFORMANCE

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SUMMARY

This study was carried out in Ahmed Orabi farm, South Tahreer Agricultural Company, West of the Nile Delta, Egypt, during the period from March 1986 to June 1989. Eighty nine bull calves representing pure Baladi (BAL), 1/4 Friesian (1/4 FR), 1/2 FR and 3/4 FR were used to evaluate body weight (BW) at birth, 12, 15 and 18 months and average daily gain (ADG) during different periods of growth (0-12 mo.) and fattening (12- 18 mo.). Thirty two male calves were randomly chosen and slaughtered at 18 months of age to compare the carcass characteristics of the four genotypes mentioned above. The statistical analysis model included the main effects of genotype and season of birth of the calf.

Genotype showed significant effect on BW and ADG. All crosses excelled the BAL in almost all comparisons. Halfbreds (1/2 FR) gained faster and had the heaviest BW among all crossbred genotypes examined. Increasing proportion of FR blood to the BAL genome beyond 1/2 FR did not improve significantly BW or ADG. Body weight and dimensions of younger ages proved to have significant predicting capacity for finial BW at 18 months of age.

Crossing Baladi cattle with FR showed marked improvement in yield of boneless meat (BM) and carcass composition. The halfbreds (1/2 FR) were the best in almost all traits investigated. Increasing FR blood beyond 50% showed no significant effect on carcass traits while backcrossing of 1/2 to BAL impaired yield of BM and carcass

composition. Season of birth showed non- significant effect on almost all traits considered.

Keywords: Grading up, Baladi cattle, Friesian and meat production

INTRODUCTION

Increasing meat and milk production by means of selection in local breeds and introducing of improved standard breeds for crossing or exploitation are common practice in cattle. Crossbreeding has been approved as effective, rapid and economic means for improving domestic beef production in Egypt (Mostageer et al.,1982; Nigm et al.,1982 & 1984; Morsy et al.,1984 and Mostageer et al.,1989).

The grade of the crossbreds showed fit in the farmers system of production. The crossbreds should produce more meat and milk than the local breed, utilizing the local feed resources more efficiently. Numerous studies were undertaken to evaluate the effect of crossing Baladi cattle with various standard exotic breeds. Very few studies, however, investigated the effect of foreign blood proportion in the crosses on their meat production performance.

The main objective of this study was to compare growth performance and carcass characteristics for the Baladi and its grades with Friesian, namely, 1/4 FR, 1/2 FR and 3/4 FR. The effect of season of birth on these traits was tested. Also, multiple regression equations were developed, using earlier body weight and dimensions of the animal's body, to predict slaughter weight, carcass weight and boneless meat weight for different genotypes.

MATERIALS AND METHODS

This study was carried out in Ahmed Orabi farm, South Tahreer Agricultural Company, West of Nile Delta, Egypt, during the period from March 1986 to June 1989. Five bulls from each of Baladi (BAL), Friesian (FR) and their F1 (1/2 FR) were used for inseminating 160 Baladi and 74 1/2 FR cows to produce BAL, 1/4 FR, 1/2 FR and 3/4 FR calves. Calving started in February 1987 and terminated August 1988. The numbers of male calves used for this study distributed according to genotype and season of birth are shown in the following table:

Genotype	Season of birth * 1	2	Total
BAL	5	12	17
1/4 FR	33	21	54
1/2 FR	4	-	4
3/4 FR	10	4	14
Total	52	37	89

* Season: 1= from December until May, 2= from June until November.

Calves suckled their dams for one week after parturition, then were pail fed on whole milk. Green fodder and concentrate mixture were available ad. lib. from the third week until weaning at 16 weeks of age. Green fodder, concentrates and roughages were offered according to Morrison requirements (Morrison,1959). At 12 months of age, calves were fed individually on ad. lib. Alfa alfa hay and rice straw. Concentrates were offered twice a day and water was available three times daily.

Body weight and dimensions were recorded at birth, 12,15 and 18 months of age. Body measurements considered were body length (BL), heart grith (HG), height at withers (HW) and abdomen girth (AG). Among the offspring, five BAL, 15 1/4 FR, four 1/2 FR, and eight 3/4 FR male calves were chosen randomly ,for slaughter test at 18 months of age .

Body weight was recorded just prior to slaughter and head, hide, four legs, full and empty rumen and intestine and edible offals; liver, heart, kidneys, testicles, spleen and lungs were all weighed and recorded. The weight of hot carcass (HCW) was recorded and only the left side was chilled for 24 hour at 5°C then reweighed to determine cold carcass weight (CCW). The left side was divided into fore and hind quarters and each was dissected into boneless meat (meat including intermuscular fat) and bone. Boneless meat (BM) was weighed and bone weight was taken as the difference between the whole side weight and weight of BM.

Data were analysed according to the General Linear Models Procedure of the Statistical Analysis System (SAS 1990). The model included the main effects of genotype and season of birth of the calf.

The following statistical model was used to analyses growth performance and carcass traits :

$Y_{ijk} = U + g_i + S_j + e_{ijk}$, where

Y_{ijk} = is the observation on the k<u>th</u> animal in the j<u>th</u> season of birth of the i<u>th</u> genotype.

μ = the overall mean.

g_i = the effect of the i<u>th</u> genotype, i=1,2,3,4; where, 1= BAL, 2= 1/4 FR , 3= 1/2 FR and 4= 3/4 FR

S_j = the effect of j<u>th</u> season of birth, j=1,2, where, 1 = from December until May and 2= from June until November.

e_{ijk} = the error term.

Multiple regression equations were also developed for predicting slaughter weight, carcass weight and boneless meat weight using earlier weight and dimensions of the animal's body for different genotypes .

RESULTS AND DISCUSSION

Body weight and average daily gain:

Table 1 presents body weight of Baladi and its grades with Friesian at birth, 12, 15 and 18 months of age. Means of season of birth classes were not listed, they were insignificantly different from each others, except for BW at 18 months of age. Mean birth weight of Baladi and its crosses ranged from 24.8 kg for BAL to 30.5 for 3/4 FR, (P< .01). Birth weight increased with the increase of FR blood. The maternal influence makes the calf birth weight partly a characteristic of the dam beside being a characteristic of the calf itself. The influence of maternal environment was strong at birth but dwindled as the animal grew older. The heterosis of the dam was accompanied by heavy weight of calves at birth. Thus it could be concluded that increasing the fraction of FR blood from 1/4 to 1/2 in BAL x FR crosses seemed to result in increased body weight at different ages. On the other hand, there was no improvement resulting by increasing FR blood in 3/4 FR. This result was in agreement with Narayanswamy <u>et</u> <u>al</u>. (1984) and Singh and Bhat (1988) .

At older ages; 12,15 and 18 months; the effect of heterosis of the calf itself on BW was clear and 1/2 FR excelled all other genotypes (Table 1) and the differences were statically significant (P<.01).

Table 1. Means[1] (±SE) of body weight (KG) of Baladi and its grades with the Friesian at different ages.

Classification	N	Age (month) 0	12	15	18
Genotype:					
BAL	17	24.8a ± 1.1	170.3a ± 5.4	220.3a ± 6.6	318.0a ± 14.1
1/4 FR	54	25.8ab ± 0.7	174.4a ± 3.1	220.4a ± 3.8	334.0a ± 6.4
1/2 FR	4	30.1c ± 2.3	216.1b ±11.0	282.8b ± 13.5	411.0b ± 17.0
3/4 FR	14	30.5bc ± 1.2	183.0a ± 5.9	235.9a ± 7.2	363.4a ± 9.3
S.V.	D.F	Mean Squares			
Genotype	3	117 **	2547 **	5386 **	9620 **
Season of birth	1	2.9 NS	395 NS	985 NS	13332 **
Residual	84	21.6	481	724	1126

1 = Means in a column followed by different letters differ significantly (P> 0.05)
NS= Non significant, ** P <0.01
At 18 months: N for genotypes were 6, 27,4 and 13 resp. and d.f. for residual =45

The 1/2 FR calves doubled their weight 7.5, 9.9 and 14.1 times the birth weight from birth to 12, 15 and 18 months, respectively (Table 2), and excelled all other crosses. The differences among genotypes were significant for growth acceleration during the period from 12- 15 months only.

Table 2. Means[1] (±SE) of body weight as ratios of birth weight at different ages.

Classification	N	BW at 12 mo. / birth wt.	BW at 15 mo. / birth wt.	BW at 18 mo. / birth wt.
Genotype:				
BAL	17	9.9ab ± 0.3	9.0a ± 0.3	13.2ab ± 0.9
1/4 FR	54	6.9ab ± 0.2	8.7ab ± 0.2	13.7a ± 0.4
1/2 FR	4	7.5a ± 0.6	9.9a ± 0.7	14.1ab ± 1.1
3/4 FR	14	6.1b ± 0.3	7.9b ± 0.4	12.2b ± 0.6
S.V.	D.F	Mean Squares		
Genotype	3	3.0 NS	6.00 *	7.8 NS
Season of birth	1	0.002 NS	0.24 NS	0.3 NS
Residual	84	1.2	1.90	4.5

1= Means in a column followed by different letters differ significantly (P> 0.05)
NS = Non significant, * P <0.05
At 18 months: N for genotypes were 6, 27,4 and 13 resp. and d.f. for residual =45.

Means of average daily gain (ADG), calculated as "final weight-initial weight" divided by days on test, are shown in table 3. The lowest ADG values occurred during the period from birth to 12 months of age. In general, all genotypes accelerated their ADG after 12 months of age and attained highest values during the period from 15 to 18 months. The overall rate of increase agrees with the findings of Goodwin (1988) and Keane et al. (1989).

Table 3. Means (±S.E.) of average daily gain (in grams).

Classification	N	Period (in months) 0 - 12	12 - 15	15 - 18	12 - 18	0 - 18
Genotype:						
BAL	17	399a±14.0	578ab± 49.4	1228a±107.0	860a±55.5	538.8a±25.0
1/4 FR	54	407a± 8.0	510a ± 28.2	1286a± 48.8	881a±25.4	567.5a±11.4
1/2 FR	4	510b±28.5	741b ±100.6	1372b±128.8	1072b±66.9	698.2b±30.1
3/4 FR	14	418a±15.2	587ab± 53.5	1441a± 70.7	979b±36.7	611.0c±16.5
S.V.	D.F			Mean Squares		
Genotype	3	14099 **	86540 NS	93642 NS	66074*	26471 **
Season of birth	1	2487 NS	16372 NS	88820 NS	1.7E+06**	39642 **
Residual	84	3214	39959	64956	17508	3551

1= Means in a column followed by different letters differ significantly ($P< 0.05$)
NS = Non significant, * $P <0.05$ and ** $P<0.01$.
At 18 months: N for genotypes were 6, 27,4 and 13 resp. and d.f. for residual =45.

During the fattening period, from 12 to 18 months, the 1/2 FR calves excelled all other genotypes in ADG. Increasing FR blood to the Baladi cattle genome caused an increase in ADG of 1/2 FR followed by 3/4 FR.

Regarding the whole period of the experiment, from birth to 18 months, the half breds showed the highest ADG among all genotypes ($P<.01$). All genotypes having FR blood exceeded the BAL but the difference between 1/4 FR and BAL did not reach the level of significance. Increasing proportion of FR blood from 1/2 to 3/4 did not improve growth rate of calves. Similar results have been reported by Taneja and Bhat (1972) on Friesian x Zebu crosses; Narayanswamy et al. (1984) on FR x Shaiwal crosses and by Mostageer et al. (1989) on Baladi and its crosses with numerous centeral European breeds.

It could be concluded that crossing Baladi cattle with Friesian would produce heavier calves with greater growth rate and heavier marketing weight. Increasing the proportion of Friesian blood from 1/4 to 1/2 in Baladi x Friesian crosses seems to result in an increased body weight at different ages.

Prediction of body weight at 18 months from yearling body weight and measurements:

Table 4 presents the multiple regression equations developed for predicting final weight, at 18 months, using yearling BW and measurements and table 5 shows the equations developed by using yearling body dimensions only. Marked genotypic differences can be observed in the accuracy of prediction (R^2). The value of R^2 varied widely among genotypes, from 100% for BAL to only 56% for 3/4 FR

(Table 4). The significance of body dimensions, also, differed considerably among genotypes. Genotypic differences were indicated earlier by Abraham et al. (1968). Dropping yearling BW (Table 5), lowered (R^2) in predicting final BW of both 1/4 FR and 3/4 FR.

Table 4. Prediction equations of final body weight (18 months) from yearling body weight and measurements of Baladi and its grades.

Genotype *	Constant	Equations	R^2
	- 465.0	+ 6.1 HG	69.0
BAL	- 516.0	+ 8.1 HG - 2.0 HW	76.0
	- 289.0	+ 5.0 HG - 4.0 HW + 5.0 AG	83.0
	-2607.0	+ 16.0 HG - 6.0 HW + 15.0 AG - 4.0 BW	100.0
	95.0	+ 1.4 BW	57.4
	296.0	+ 2.1 BW - 2.2 AG	65.9
1/4 FR	550.0	+ 2.4 BW - 2.6 AG - 2.2 HW	71.8
	507.0	+ 2.2 BW - 2.3 AG - 2.4 HW + 0.8 BL	72.2
	534.0	+ 2.2 BW - 2.3 AG - 2.4 HW + 0.8 BL - 0.6 H	72.7
1/2 FR	336.4	+ 0.3 BW	52.7
	892.4	+ 0.7 BW - 5.7 BL	92.1
	14.3	+ 1.9 BW	47.7
3/4 FR	184.0	+ 2.0 BW - 1.8 BL	53.3
	332.3	+ 2.1 BW - 2.1 BL - 0.8 HG	55.5

* Numbers of BAL, 1/4, 1/2 and 3/4 FR were 6, 27, 4 and 13 male calves, resp.

Table 5. Prediction equations of final body weight (18 months) from yearling body measurements of Baladi and its grades.

Genotype *	Constant	Equations	R^2
	- 465.0	+ 6.1 HG	69.0
BAL	- 516.0	+ 8.1 HG - 2.0 HW	76.0
	- 289.0	+ 5.0 HG - 4.0 HW + 5.0 AG	83.0
	-1717.0	+ 19.0 HG - 8.3 HW + 14.0 AG - 14.0 BL	97.0
	- 129.0	+ 4.3 BL	30.0
	- 151.0	+ 3.4 BL - 0.8 AG	32.0
1/4 FR	- 68.0	+ 3.4 BL - 1.5 AG - 1.4 HG	34.0
	20.0	+ 5.0 HW - 1.4 AG - 1.1 BL	35.0
1/2 FR	319.5	+ 0.6 HG	51.0
	938.1	+ 5.4 HG - 8.4 AG	83.3
	- 42.0	+ 3.8 HW	20.3
3/4 FR	- 243.1	+ 4.2 HW - 1.0 AG	25.6
	- 456.0	+ 5.0 HG - 1.4 AG - 1.1 BL	27.3

* Numbers of BAL, 1/4, 1/2 and 3/4 FR were 6, 27, 4 and 13 male calves, resp.

Heart girth was the most significant predictor among the various body dimensions and body weight in Baladi. This measure was the best single factor responsible for the prediction of Baladi's BW with an accuracy of 69% . However, in the other three genotypes studied yearling BW came firstly as a single predictor for final BW (table 4). Comparable results were reported by Brown et al. 1974; Abdallah and Rashad, 1981; Sekasiddhi et al. 1987 and Nicholson and Sayers, 1988.

Prediction of body weight at 18 months from body weight and measurements at 15 months of age:

Table 6 presents multiple regression equations developed for predicting finial BW from body weight and dimensions at 15 months and table 7 presents equations resulting from using body dimensions alone. In all genotypes, except for 1/2 FR, BW ranked firstly in the prediction equations. Body weight contribution to total variation in final weight ranged from 51 in 3/4 FR to 76% in BAL (Table 6). Heart girth almost lost its predicting capability and was replaced by abdomen girth, height at withers and body length. These results are in agreement with the finding of Tripathi et al., 1987 on Gir cattle where HG ranked third after HAW and BL.

Table 6. Prediction equations of final body weight (18 months) from 15- month body weight and measurements of Baladi and its grades.

Genotype *	Constant	Equations	R^2
	93.0	+ 1.1 BW	76.0
BAL	555.0	+ 2.0 BW - 5.6 HW	92.0
	365.0	+ 2.0 BW - 6.0 HW + 2.0 AG	96.0
	-1003.0	- 0.8 BW - 6.2 HW + 5.4 AG + 13.0 BL	99.7
	109.0	+ 1.0 BW	60.0
	- 72.0	+ 0.8 BW + 2.1 BL	62.0
1/4 FR	- 204.0	+ 0.5 BW + 2.6 BL + 0.8 HG	64.0
	- 277.0	+ 0.5 BW + 2.5 BL + 0.8 HG + 0.8 HW	64.3
1/2 FR	191.2	+ 1.2 AG	80.3
	29.3	+ 3.0 AG - 0.5 BW	99.9
	102.0	+ 1.1 BW	51.0
	- 201.0	+ 1.0 BW + 2.0 AG	60.0
3/4 FR	- 462.0	+ 1.0 BW + 2.2 AG + 2.4 HW	66.0
	- 569.0	+ 1.0 BW + 2.0 AG + 3.1 HW + 0.6 HG	69.0
	- 688.0	+ 0.7 BW + 2.2 AG + 3.2 HW + 0.5 HG + 0.8 BL	69.3

* Numbers of BAL, 1/4, 1/2 and 3/4 FR were 6, 27, 4 and 13 male calves, resp.

Accuracy of prediction was relatively improved as animals got older (15 months). This is expected as BW and dimensions of animal got closer to the predicated trait. Exclusion of BW resulted in only minor reductions in R^2, in most cases (Table 7). Body dimensions, alone, had accuracies of 100%, 97, 62% and 58% in cases of BAL, 1/2 FR, 1/4 FR and 3/4 FR, in their respective order.

The results indicated that earlier body weight and dimensions of the animal could reasonably be used in predicting its marketing weight. Dimensions of the animal's body could be of practical importance in assessing animal weight; especially under field conditions where BW itself may not be easy to measure.

Table 7. Prediction equations of final body weight (18 months) from 15 month body measurements of Baladi and its grades.

Genotype *	Constant	Equations	R^2
	- 393.0	+ 6.4 BL	69.0
BAL	- 531.0	+ 4.3 BL + 2.4 AG	80.0
	- 563.0	+ 9.0 BL + 4.3 AG - 6.3 HW	99.4
	- 557.0	+ 8.4 BL + 4.0 AG - 6.5 HW + 0.7 HG	99.5
	- 306.0	+ 5.6 BL	48.0
1/4 FR	- 444.0	+ 4.4 BL + 1.7 AG	60.0
	- 520.0	+ 4.1 BL + 1.6 AG + 1.0 HG	62.0
1/2 FR	191.2	+ 1.2 AG	80.3
	211.3	+ 2.0 AG - 1.0 HG	96.6
	- 164.2	+ 3.2 AG	27.7
3/4 FR	- 596.4	+ 3.2 AG + 3.9 HW	40.6
	-1019.0	+ 3.6 AG + 4.0 HW + 3.0 BL	55.6
	-1070.0	+ 3.2 AG + 4.6 HW + 2.7 BL + 0.6 HG	58.4

* Numbers of BAL, 1/4, 1/2 and 3/4 FR were 6, 27, 4 and 13 male calves, resp.

Slaughter weight, carcass weight and dressing percentage:

Table 8 presents least squares means and mean squares of slaughter weight (SW), empty body weight (EBW), hot carcass weight (HCW) and cold carcass weight (CCW) of Baladi (BAL) and its grades with Friesian (FR) cattle. The genotype exerted highly significant effect (P<.01) on all the abovementioned traits, but no significant effect was detected for season of birth. All genotypes, except for the 1/4 FR, had higher estimates of SW, EBW, HCW and CCW than the BAL, the differences between BAL and 1/4 FR were nonsignificant. The 1/2 FR scored the heaviest estimates followed by 3/4 FR. Similar results have been obtained by Taneja and Bhat (1972), Naraynswamy et al. (1984) and Mostageer et al. (1989). However, Crouse et al. (1989) reported that 25% Bos indicus (Brahman or Sahiwal) crosses were significantly heavier than 50 or 75% Bos indicus crosses with FR.

Table 8. Means[1] (±SE) and mean squares of slaughter weight, empty body weight, hot carcass weight and cold carcass weight of Baladi and its grades with Friesian cattle.

Classification	N	SW (kg)	EBW (kg)	HCW (kg)	CCW (kg)
Genotype:					
BAL	5	349ab ± 14.7	321ab ± 13.9	203ab ± 10.2	199ab ± 10.0
1/4 FR	15	338a ± 7.8	306a ± 7.4	191a ± 5.5	186a ± 5.4
1/2 FR	4	402c ± 15.2	371c ± 14.4	241c ± 10.7	237c ± 10.4
3/4 FR	8	375bc ± 10.7	338bc ± 10.1	211b ± 7.5	206b ± 7.3
S.V.	D.F	Mean Squares			
Genotype	3	5244 **	4793 **	2718 **	2877 **
Season of birth	1	8.7 NS	183 NS	49 NS	189 NS
Residual	27	904	809	431	414

1 = Means in a column followed by different letters differ significantly (P< 0.05)
NS= Non significant, ** P <0.01

Table 9 presents means and mean squares of dressing percentages of the BAL and its grades with Friesian. Among all genotypes involved, 1/2 FR had the highest percentage of HCW/EBW (65%) followed by the BAL (63.4%), differences, however, were not significant. The same trend can be seen for CCW/EBW percentage.

The percentage of EBW/SW could be used as an indicator of the effective size of the alimentary tract. The 1/2 FR showed the highest percentage (92.2%).

Carcass composition

The market value of the carcass is mainly determined by the amount of meat and edible parts. So, the most remarkable comparative traits among different breeds or crosses is the quantity of saleable meat or edible parts. Table 10 shows least squares means and mean squares of the traits representing carcass composition of the Baladi and its grades with Friesian. Genotypic differences in meat weight (boneless meat, BM) were significant (P<.05). The 1/2 FR carcasses yielded significantly (P< 0.01) the highest amount of BM (197 kg) and edible parts (211 kg). When BM and edible parts were expressed as percentage from

EBW, 1/2 FR scored the highest percentage of 53.4 and 57.1%, respectively, and the differences became significant.

Table 9. Means[1] (±SE) and mean squares of dressing percentage of Baladi(BAL) and its grades with Friesian (FR) cattle.

Classification	N	% HCW/BW	%CCW/BW	%HCW/EBW	%CCW/EBW	%EBW/BW
Genotype:						
BAL	5	58.3ab± 1.1	57.0ab± 1.1	63.4 ± 1.3	62.0 ± 1.2	91.9±0.8
1/4 FR	15	56.4a ± 0.6	54.9a ± 0.6	62.3 ± 0.7	60.6 ± 0.7	90.6±0.4
1/2 FR	4	59.9b ± 1.2	59.1b ± 0.2	65.0 ± 1.3	64.1 ± 1.3	92.2±0.8
3/4 FR	8	56.4a ± 0.8	54.9a ± 0.8	62.6 ± 0.9	60.9 ± 0.9	90.1±0.6
S.V.	D.F	Mean Squares				
Genotype	3	16.4 *	22.5 *	8.3 NS	13.6 NS	11.3 NS
Season of birth	1	5.1 NS	17.1 NS	0.7 NS	1.8 NS	23.0 **
Residual	27	5.4	5.1	6.8	6.3	2.5

1 = Means in a column followed by different letters differ significantly (P< 0.05)
NS= Non significant, * P <0.05, ** P <0.01

Genotypic differences in bone weight were highly significant (P<.01), the 1/2 FR had the highest bone weight (34.7 kg) and the 1/4 FR had the lowest (28.5 kg). When taken as % from EBW, the values ranged from 9.1% in the 3/4 FR to 9.6% in the BAL, differences were not significant. Also, no significant differences were observed among all genotypes with respect to meat: bone ratio.

Non-carcass fat (NCF) could be used to indicate carcass fatness. Genotype did not show significant effect on either NCF weight or on its % from EBW. The pure Baladi, however had the highest % of NCF (3.5%) followed by 1/4 FR (3.3%) while the other two genotypes scored only 2.9% NCF. Mostageer et al. (1982) indicated that the Baladi is an early mature breed when compared with Friesian and other centeral European breeds and their crosses with the Baladi. The reduction in % of NCF is expected to improve daily gain and feed efficiency of beef animals.

In general, there was no need to increase % of FR blood over 50% for improving carcass composition, since the 1/2 FR still had the best performance in each of boneless meat and edible parts whether expressed as absolute weights or relative to EBW. Also, backcrossing of halfbreds to pure Baladi impaired carcass composition and yield of edible meat; the BAL excelled 1/4 FR in all comparisons.

Table 10. Means[1] (±SE) and mean squares of carcass composition of Baladi(BAL) and its grades with Friesian (FR) cattle.

Classification	N	Meat (kg)	Meat/EBW (%)	Edible parts (kg)	Edible parts/ EBW (%)	Non-carcass fat (kg)	Non-carcass fat/EBW (%)	Bone (kg)	Bone/EBW (%)	Meat/bone ratio
Genotype:										
BAL	5	167a ± 9.3	52.3 ± 1.2	181a ± 9.6	56.4 + 1.2	11.0 ± 0.8	3.5 ± 0.3	31.5a ± 1.2	9.6 ± 0.3	5.4 ± 0.3
1/4 FR	15	157a ± 5.0	51.3 ± 0.7	170a ± 5.1	55.4 + 0.7	10.1 ± 0.5	3.3 ± 0.1	28.5a ± 0.6	9.4 ± 0.2	5.5 ± 0.1
1/2 FR	4	197b ± 9.7	53.4 ± 1.3	211a ± 10.0	57.1 + 1.3	10.9 ± 0.9	2.9 ± 0.3	34.7b ± 1.3	9.4 ± 0.4	5.7 ± 0.3
3/4 FR	8	176b ± 6.8	51.9 ± 0.9	189b ± 7.0	55.9 + 0.9	9.8 ± 0.6	2.9 ± 0.2	30.6a ± 0.9	9.1 ± 0.2	5.8 ± 0.2
S.V.	D.F	------------------- Mean Squares -------------------								
Genotype	3	1828 **	4.67 NS	1962 **	3.3 NS	2.02 NS	0.5 NS	42.6 **	0.43 NS	0.2 NS
Season of birth	1	98.6 NS	0.30 NS	94 NS	0.1 NS	9.10 NS	1.2 NS	1.5 NS	0.01 NS	0.001 NS
Residual	27	357	6.60	382	6.5	3.1	0.3	7.6	0.60	0.3

1 = Means in a column followed by different letters differ significantly (P<0.05)
EBW = Embpty body weight
NS= Nqn significant * P<0.05 ** P <0.01
Edible parts = meat + liver + kidneys + heart + spleen + testes

Date of birth showed no significant effect on any of the carcass composition characteristics examined (Table 10).

Prediction of boneless meat yield

Cattle with higher conformation score would have higher cutability than those with lower conformation score if carcasses are the same weight and posses the same fat thickness (Tyler et al., 1964 and Martin et al., 1966). Stockmen look for applicable criteria, for selecting animals for fattening. Which are related to future production of meat at older ages. Table 11 presents the multiple regression equations developed to predict boneless meat weight by using BW and body dimensions of the Baladi and its grades with Friesian slaughtered at 18 months of age. The significance of BW at all ages (12, 15 & 18 mo.) and body dimensions varied considerably among genotypes and ages in the prediction of boneless meat. Body weight contributed significantly to the variation in meat weight of all genotypes expect the purebred BAL at 15 months and the 1/2 FR at 15 and 18 months. Body length was the major predictor for two genotypes; the BAL at 12 and 15 months and the 1/4 FR at 15 months. Height at withers was the most important factor in predicting capacity only in the case of 1/2 FR at the three ages.

Elimination of BW, type 2 equations, showed no effects in cases of BAL at 15 months and 1/2 FR at 15 and 18 months and exerted minor reduction in values of R^2 in cases of BAL at 18 months and 1/2 FR at 12 months. Again, when BW was dropped, R^2 was drastically reduced from 99.6 to 66% for BAL, from 93.9 to 68.5 for 3/4 FR and from 71.6 to 61.1% for 1/4 FR, at 12 months. The most marked reduction observed at 15 months was in case of 3/4 FR, from 89.9 to 52.3% followed by that for 1/4 FR from 73.3 to 63.7%.

At 18 months old, since BW was the most significant predictor of meat weight for all genotypes, expect the 1/2 FR , dropping BW was expected to change the values of R^2 and the variables incorporated into the predication equations. On the other hand, the values of R^2 were not highly affected except those for 1/4 FR and 3/4 FR. Different predictors replaced BW in the different genotypes with variable fitness; HG for BAL and AG, BL for 1/4 FR and 3/4 FR, in their respective order.

Table 11. Multiple regression equations developed for predicting boneless meat weight from body weight and dimensions

Genotype	Age (mo) at prediction	Type* of equation	Equations	R^2
BAL	12	1	-1453+14(BL)-4.3(BW)+6.0(AG)	99.6
		2	- 304+1.1(BL)-1.9(HW)+4.0(AG)	66.0
	15	1	- 531+7.7(BL)+2.4(AG)-5.0(HW)	96.0
		2	- 531+7.7(BL)+2.4(AG)-5.0(HW)	96.0
	18	1	32+0.5(BW)-2.1(AG)-2.5(BL)	99.8
		2	- 178+7.0(HG)-2.2(AG)-3.0(HW)	99.6
1/4 FR	12	1	165.2+0.9(BW)-1.9(HW)-1.1(AG)+0.9(BL)+0.9(HG)	71.6
		2	-90.8+1.8(BL)+1.4(HG)-1.2(HW)	61.1
	15	1	-546.7+3.6(BL)+3.1(AG)-0.9(BW)	73.3
		2	-162.6+2.2(BL)+1.3(AG)-0.8(HW)-0.2(HG)	63.7
	18	1	-49.9 +0.5(BW)+0.5(AG)-0.2(HG)	90.7
		2	-316.8+1.5(AG)+0.5(HW)+0.7(HG)+0.4(BL)	77.8
1/2 FR	12	1	- 79.3+2.7(HW)-0.1(BW)	86.8
		2	- 32.4+2.3(HW)-0.2(HG)	86.1
	15	1	- 65.0+1.9(HW)+0.2(HG)	99.8
		2	- 65.0+1.9(HW)+0.2(HG)	99.8
	18	1	-263.6+1.2(HW)+2.2(BL)	97.9
		2	-263.6+1.2(HW)+2.2(BL)	97.9
3/4 FR	12	1	1047+1.4(BW)-2.7(HG)-5.2(HW)-1.3(BL)-0.3(AG)	93.6
		2	-199.6-2.9(HG)+3.9(BL)+2.4(AG)	68.5
	15	1	-441.8+0.8(BW)+1.8(AG)+0.7(BL)+0.4(HW)	89.9
		2	-468.1+2.7(BL)+1.9(AG)+0.2(HG)	52.3
	18	1	409.9+0.7(BW)-0.3(AG)-1.5(HW)-2.5(HG)+1.5(BL)	95.1
		2	206.5+4.2(BL)-2.5(HG)-1.3(HW)	85.4

* (1) BW included and (2) BW excluded from the prediction equation.

Comparing the values of accuracy obtained at different ages showed that prediction at 12 or 18 months was more accurate than that made at 15 months. Also, the R^2 at 18 months increased by 19%, 11% and 1% from that obtained at 12 months for the 1/4 FR, 1/2 FR and 3/4 FR, respectively.

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REFERENCES

Abdallah, O.Y. and S.M. Rashad, 1981. Studies on the estimation of Live Weight of cattle and buffaloes. II. Stepwise procedures used in estimating live weight of Egyptian Baladi Bulls body easting live weight of Univ., Fac., of Agric. Bull., 1965.

Abraham, H.C., Z.L. Carpenter, G.T. King and O.D. Butter, 1968. Relationships of carcass weight, Conformation and carcass measurements and their use in predicting beef carcass cutability. J. Anim. Sci., 27:604.

Brown, G.T., J.E. Brown and W.T. Butts, 1974. Evaluating relationships among immature measurements of size, shape and performance of beef bulls. IV. Regression models for Predicting postweaning performance of young Herford and Angus bulls using measurements of size and shape. J.Anim. Sci., 38:12.

Crouse, J.D., L.V. Cundiff and R.M. Koch, 1989. Comparison of Bos indicus and Bos taurus inheritance for carcass beef characteristics and meat palatability. J. Anim. Sci., 67:2661.

Goodwin, D.H. 1988. " Beef Management and Production " A Practical guide for farmers and students. Hutchinson & Co. Publisher. U.K. PP. 22-24.

Keane, M.G.O., G.J.M. Ferral and L.H. Gonndly, 1989. Growth and carcass composition of Friesian, Limousin x Friesian and Blande d'Aquitaine x Friesian steers. Anim. Prod., 48:353.

Martin, E.U., L.E. Walters and J.V. Whiteman, 1966. Association of beef carcass conformation with thick and thin muscle yields. J. Anim. Sci., 25:682.

Morrison, B.F. 1959. "Feeds and Feeding". Iowa, Morrison Publication Co., U.S.A.

Morsy, M.A., A.A., Nigmm A. Mostageer and F. Pirohner, 1984. Some economic characteristics of the Egyptian Baladi cattle. Egypt. J.Anim. Prod., 24:274.

Mostageer, A., A.A. Nigm, M.A. Morsy and F. Pirchner, 1982. Carcass traits in the Baladi cattle and in their crosses with European breeds. Z. Tierzachtg. Zuchtgsbiol., 99:101.

Mostageer, A., F., Pirchner, M.A., Morsy, A.A. Nigm, N.S. Rashad, and M.A. Ibrahim, 1989. The Potential of cattle population- A slaughter test on Baladi and its crosses. Ruminant Production in the Dry Subtropics: Constraints and Potentials. Pudoc, Wageningen 1989, The Netherlands.

Narayswamy, M., D.S. Balaine and S. Shriam, 1984. Studies on growth efficiency in Friesian x Sahiwal crosses. Indian J. Dairy Sci., 37:44.

Nicholson, M.J. and A.R. Sayers, 1988. Relationships between body weight, condition score and heart girth in Boran cattle. Anim. Breed. Abstr., 55:5.

Nigm, A.A., M.A. Morsy, A. Mostageer and F. Pirchner,. 1982. The Performance of the Baladi cattle and its crosses with five European breeds. 1. Growth performance from birth to six months of age. Proc. 6th International Conf. On Animal and Poultry Production, Zagazing, Egypt, Sept. 21-23, 1982.

Nigm, A.A. A. Mostageer, M.A. Morsy and F. Princhner, 1984. Feed efficiency of beef production of Baladi and its crosses with central European Cattle. Z. Teerzuchtg- Zuchtgsbiol., 101:173.

Sekasiddhi, P.K., S. Singheyan, K. Wattchsi and Chetikasathien. 1987. Project of Progeny testing in the A.I. bulls. 1. Preliminary study of Performance test of Holstein Friesian crossbred dairy cows at Ratchaburi. Anmi. Breed. Abstr., 55:250.

Sing, B. and P.N. Bhat , 1988. Effect of crossbreeding on body weight changes in Holstein x Sahiwal crossbreds. Anim. Breed. Abst., 56:597.

Statistical Analysis System Institute, Inc., 1990. Statistical Methods. SAS Institute, Inc., Cary, Nc.

Taneja, V.K. and P.N. Bhat, 1972. Genetic and non-genetic factors affecting body weights in Sahiwal x Friesian crosses. Anim. Prod. 14:295.

Tripathi, G.S., G.L. Koul and B.G. Katpatal,. 1987. Predicting weight from body measurements. Indian J. Diary Sc., 31:204.

Tyler, W.E., D.K. Halleter, C.E. Murphey, K.E. Hoke and Breidenstein, 1964. Effects of variation in conformation on cutability and palatability of beef. J. Anim. Sci., 23:865.

تأثير تدريج الماشية البلدية بماشية الفريزيان على كفاءة انتاج اللحم

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أجريت هذه الدراسة فى مزرعة أحمد عرابى بشركة جنوب التحرير الزراعية فى الفترة من مارس ١٩٨٦ الى يونيو ١٩٨٩ على عدد ٨٩ من ذكور الماشية البلدية وخلطانها مع ماشية الفريزيان (١٧ من البلدى النقى، ٥٤ من ٤/١ فريزيان ، ٤ من ٢/١ فريزيان ،١٤ من ٤/٣ فريزيان). وكان الهدف من الدراسة هوتقييم وزن الجسم عند أعمار الميلاد ،١٢، ١٥ ، ١٨ شهر ومتوسط الزيادة اليوميه خلال فترتى النمو (الميلاد - ١٢ شهر) والتسمين (١٢ - ١٨ شهرا) وكذا مقارنة صفات الذبيحه على عمر ١٨ شهر للتراكيب الوراثية الأربعة السابقة الذكر.

وتتلخص أهم النتائج المتحصل عليها فى الاتى :

١. أظهر التركيب الوراثى تأثيرا معنويا على وزن الجسم ومتوسط الزيادة اليومية، حيث تفوقت جميع الخلطان على البلدى فى معظم المقارنات.

٢. حقق خليط ٢/١ فريزيان أكبر وزن للجسم وأسرع متوسط زيادة يوميه ، وتبين أن زيادة نسبة دم الفرزيان عن ٥٠٪ لم يحسن معنويا وزن الجسم ومتوسط الزيادة اليومية .

٣. أظهرت معادلات الانحدار المتعدد امكانية استخدام وزن الجسم ومقاييسه عند أعمار ١٢ ، ١٥ شهر فى التنبؤ بوزن الجسم عند عمر ١٨ شهر .

٤. أدى تدريج الماشية البلديه مع ماشية الفريزيان الى تحسين واضح فى كمية اللحم الخالى من العظم ومكونات الذبيحة، وكان أيضا خليط ٢/١ فريزيان هو الافضـــل فى جميع الصفات المدروسة، ولم تتحسن معنويا صفات الذبيحة بزيادة نسبة دم الفريزيان عن ٥٠٪.

٥. أظهر فصل سنة ميلاد العجل تأثيرا غير معنويا على معظم الصفات المدروسة ٠