

Performance Growth and Carcass Traits in Crossbreed Lambs from Afshari, Fashandi and Zandi Rams with Zandi Ewes in Feedlot Condition

¹Keshtkaran Alinaghi and ²Lavvaf Abolghasem

¹Department of Animal Science, Faculty of Agriculture, University of Yasouj, Iran

²Faculty of Agricultural and Natural Resources, Islamic Azad University, Karaj Branch, Iran

Abstract: The effect of crossbreeding between Afshari, Fashandi and Zandi rams with Zandi ewes on growth and carcass traits was studied using 45 and 30 lambs, respectively in feedlot condition. The individually feedlot was done for 100 days in the same management and as fed condition. The results show that the significant effect of crossbreeding on daily gain and dry mater intake that's be highest for Afshari group and equal to 0.180 ± 0.004 and 1.415 ± 0.025 , respectively whereas the difference for feed conversion ratio was not significant. The breed of lamb affected the final feedlot weight, empty body weight, hot carcass weight and carcass efficiency significantly that's be highest for Afshari group and equal to 44.70 ± 1.25 , 38.85 ± 1.05 , 22.63 ± 0.95 kg and $58.63 \pm 0.77\%$, respectively. The breed of ram did not significantly affected the percentage of loin, shoulder, brisket, fat tailed, tallow and total removable fat, however the percentage of thigh was significantly different between three groups. Also lean and fat percentage of sampling area were significantly highest for Fashandi and Zandi group, respectively and for bone percentage of sampling area, carcass length and longissimus muscle area the different were not significant.

Key words: Crossbreeding, Afshari, Fashandi, Zandi, carcass traits, Iran

INTRODUCTION

Sheep husbandry in Iran to be directed traditional method usually and most producers attempt to higher efficiency production by increase sheep number in herd. So, results to sever hard management as well as irreparable impact on feed resource condition and pastures according to Nori and Mansour (1992) and Pour (1998). Genetic groups and types of Iranian native sheep was different in locality and caused by various ecological condition, continues and different emigration, mutation and natural and artificial selection. The studied results on crossbreeding methods on sheep breeding shown that in most breeding systems crossbreeding used for combination of suitable traits in different breeds of sheep and results to beneficial condition. In addition, results show that crossbreeding is a suitable method for production traits improvement using by distinctive between breeds. Cloete *et al.* (2007) shown that satisfactory effects of terminal crossbreeding on sheep production economic traits. Ozcan *et al.* (2002) and Altinel *et al.* (2001) confirm the effect of two and three way method crossbreeding on early growth traits and other growth traits in feedlot condition. In most countries, especially for meat production systems, commercial

crossbreeding was used for slaughter able lamb production as suggest by Jome (1993), Gokdal *et al.* (2004), Newman *et al.* (2002) and Sunudo *et al.* (2000). Noshary were show suitable effects of crossbreeding on daily gain in feedlot condition. Izadifard and Dadpasand (2007) shown that more daily gain and carcass composition in crossbreed than purebred lambs. Also, meat quality and carcass traits improvement, more daily gain and better feed conversion ratio was show by Ozcan *et al.* (2001) in two and three way crossbreeding design.

Crossbreeding is one of method to obtain optimum body size. Also, it is important to decrease carcass fat content in current years, therefore we must study the characteristics of different breeds and their crosses for introducing carcass with optimum meat to fat ratio.

The accurate employment of native breeds of sheep are demanding to recognize production capability, breed characteristics and crossbreed performance from the point view of lamb growth and carcass quality and this problem is very important if notice the various breeds of sheep. To obtain this purpose, the crossbreeding design study was performed between Afshari and Fashandi breeds that's famed for growth rate, large body size and carcass value with Zandi breeds that's be inadequate to them.

The aim of this study, evaluation and comparison between ram lamb from one way crossbreeding of Afshari, Fashandi and Zandi rams with Zandi ewes respecting growth rate, feed consumption and efficiency as well as carcass traits in feedlot condition.

MATERIALS AND METHODS

Experimental design and feedlot condition: The effect of one way crossbreeding on crosses ram lamb between Afshari, Fashandi and Zandi rams with Zandi ewes was study in Meyanroud region of Shiraz Province. The total required ram and ewe were collected from pure breed herds in related Province. The lambs were weaned in 90±3 days of age and feeding with Alfalfa and pastures to start of feedlot period. The lambs that be used in this study randomly selected through ram lambs of each genetic groups in about 15 head and then fatten by individually condition for 100 days in the end of summer. The age and weight of total lambs (45 head) were determined at the start of trial and feedlot condition were done by same management and feeding and they feed same total mixed ration 3 times a day in separated manger by as feed condition. The individually weighting of lamb was done each 20 days of trial after 12-15 h of lastly feeding and 6 h of thirst. The dry matter content of feed was determined by sampling of feed conversation each 10 days. The remainder of feed was collected and weighting in morning individually and sampling for determination of dry matter intake.

The carcass traits study: The last weighting of lambs was recorded individually at the end of feedlot as final feedlot weight and then 10 lambs of each genetic groups were selected and slaughtered randomly and used for determination hot carcass weight (weight of carcass after remove of guts), empty body weight (final feedlot weight without blood and gastrointestinal content), carcass percentage to empty body weight, carcass fragments percentage, carcass length and longissimus muscle area (in the region of 12, 13 ribs and right of half carcass). Also, a sample of 10, 11, 12 ribs region was prepared and used for determination of lean, fat and bone percentage by physical method as representation of total carcass content.

Data analysis: Data analysis of this research was used by SAS-12 software and normality test of data and residuals were done by Chi-square method. The effect of age of lambs at the start of feedlot condition divided into 15 days interval and body weight in each weighting was used as covariate effect. The data was analysed by following model:

$$Y_{ij} = \mu + R_i + A_j + b B_{ij} + e_{ij}$$

Where:

- Y_{ij} = Each of observation
- μ = Mean of observation
- R_i = The effect of ith ram breed (i = 1, 2, 3)
- A_j = The effect of jth lamb age at the start of feedlot (j = 1, 2, 3, 4, 5)
- b = The linear regression coefficient for growth traits, dry matter intake and feed conversion ratio on body weight at the start of feedlot as a covariate
- B_{ij} = The covariate effect of body weight at the start of feedlot
- e_{ij} = The residual random effect

RESULTS AND DISCUSSION

Feedlot performance: The growth rate is an important propose in sheep breeding for meat production or feedlot condition because it has direct relationship with economical efficiency (Pour, 1998; Nori and Mansour, 1992). Results in Table 1 shows that the significant effect of ram breed in daily gain and dry matter intake (p<0.05) so that as in Afshari group have more daily gain and dry matter intake than other groups and for Zandi group this superiority is significant (p<0.05) and this different can be caused by different ram breed used in crossbreeding and body size of them, according to results of Izadifard and Dadpasand (2007), Nicoll *et al.* (1998), Makarechian *et al.* (1977) and Hassan and El-Feel (1991) that’s show benefit effect of crossbreeding on lamb growth rate.

The Feed Conversion Ratio (FCR) is an important traits in feedlot because feed casts is about 65-75% of total casts in sheep production and had an important effect in economic efficiency. The results in Table 1 shows that there is no significant different between genetic groups for FCR nevertheless the Fashandi lambs had better FCR related to other groups.

Noshary shows that the positive effect of crossbreeding on daily gain for one way crossbreeding system of Afshari, Shall, Moghani and Varamini rams with Varamini ewes but they don’t have any significant effect for FCR. Jome (1993) show that the better FCR on Shall pure breed related to crossbreed lamb of Zandi ram with Shall ewe. It is important to detection of

Table 1: The Least square means and standard error of daily gain (kg), dry matter intake (kg) and Feed Conversion Ratio (FCR) by genetic group

Genetic group	Daily gain (kg)	Dry mater intake (kg)	FCR
Afshari	0.180±0.004 ^{a*}	1.415±0.025 ^b	6.817±0.160
Fashandi	0.170±0.004 ^{ab}	1.290±0.025 ^{ab}	6.690±0.150
Zandi	0.175±0.005 ^b	1.399±0.026 ^{ab}	6.715±0.154

*The different letter in each column show significantly different between means

ram and ewe effect in crossbreeding designs by two-way crossbreeding system because the important of FCR on economical efficiency in feedlot.

Carcass traits analysis: In order to determine sheep ability for meat production, we must study carcass efficiency and quality, weight of it's practices or other subordinate slaughter productivity. The results in Table 2 show that the significant effect of crossbreeding on all traits and Afshari ram lambs has most final feedlot weight, empty body weight, hot carcass weight and carcass efficiency and this superiority had significant effect relative to Zandi lambs because higher body size relative to Zandi breed.

The hot carcass had an important effect on carcass quality determination and results in Table 2 shows helpful effect of Afshari crossbreed in this study. Also, the standard error of estimation for hot carcass are decreased and show that the increase of accuracy and variation in contamination and content of Gastrointestinal especially and confirm the superiority of hot carcass relative to other traits to compare between genetic groups.

The carcass weight fraction in total body weight is important parameter to meat production determination and it is important to improvement this traits according to Altinel *et al.* (2001). The results of Table 2 shows that positive effect of Afshari crossbreed on carcass efficiency improvement and this trend have shown in other study such as Izadifard and Dadpasand (2007), Azar *et al.* (2007), Jome (1993), Huidobro and Jurado (1998) and Al-Sabbagh *et al.* (1996), so the effect of breed of ram is important on for carcass traits and depend on design of crossbreeding system.

Carcass fragment percentage: In this study we assessed the percentage of thigh, loin, shoulder, brisket, fat tailed, tallow (include the fat around of gastrointestinal, heart, kidney and removable fat from abdominal area) and total

Table 2: The least square means and standard error for early carcass traits by genetic groups

Genetic group	Final feedlot weight (kg)	Empty body weight (kg)	Hot carcass weight (kg)	Carcass efficiency
Afshari	44.70±1.25 ^{a*}	38.85±1.05 ^a	22.63±0.95 ^a	58.63±0.77 ^a
Fashandi	43.70±1.15 ^a	37.63±1.03 ^{ab}	21.08±0.87 ^{ab}	56.19±0.57 ^b
Zandi	41.50±1.19 ^b	36.57±1.03 ^b	20.11±0.85 ^b	55.11±0.55 ^{b*}

The different letter in each column show significantly different between means

Table 3: The least square means and standard error for carcass fragment percentage and carcass fat by genetic group

Genetic group	Loin (%)	Thigh (%)	Shoulder (%)	Brisket (%)	Fat tailed (%)	Tallow (%)	Total removable fat (%)
Afshari	15.22±0.22	28.15±0.45 ^{a*}	15.20±0.35	11.75±0.21	18.52±0.85	1.95±0.11	20.47±0.90
Fashandi	15.09±0.20	28.07±0.43 ^a	15.45±0.32	12.42±0.22	17.62±0.83	2.33±0.12	19.95±0.93
Zandi	15.13±0.19	28.46±0.42 ^b	15.90±0.29	12.22±0.21	18.32±0.92	2.25±0.11	20.57±0.95

*The different letter in each column show significantly different between means

fat tailed and tallow as a criteria of removable carcass fat. The results of Table 3 show that the positive effect of crossbreeding to increment of thigh and loin percentage as two important fragments of carcass and in Afshari ram lambs this traits is higher than others but this difference were significant only for thigh percentage. Also the percentage of shoulder, brisket and fat tailed has no significantly between genetic groups.

In the study of Elliss *et al.* (1997) the ram breed has significant effect on thigh and shoulder weight. Farid (1991) shows that the carcass percentage in large fat tailed sheep is higher than others and it's crossbred and different between pure and crossbreed for carcass percentage is erase after remove fat tailed of carcass. However in this study there are no significant different for fat tailed percentage and can be influenced by variation on mature size of breeds.

In the study of Izadifard and Dadpasand (2007) there was no significant effect of crossbreeding on weight and percentage fat tailed and fat removable percentage. Kashan *et al.* (2005) shows the significant different between pure and crossbreed lamb for fat percentage. In this study the total percentage of fat tailed and tallow is optimal for Fashandi groups and agreement with better FCR in this group. In many study the higher FCR to be compatible with higher fat carcass resource in feedlot condition.

Tissue composition, carcass length and longissimus muscle area:

In this study, the tissue composition including lean, fat and bone ratio in sampling area as criteria of whole carcass as well as carcass length and longissimus muscle area were analyzed and shown in Table 4.

The results in Table 4 shows that lean and fat carcass percentage significantly different by genetic group and Afshari lambs had most lean and Fashandi lambs had least fat relative to others (p<0.05). Also the bone in Zandi lamb had least relative to others significantly.

The lower fat percentage in sampling area for Fashandi lamb correspond with lower fat tailed and tallow in this genetic group and confirm low carcass fat for them. The carcass length and longissimus muscle area are important criteria for muscularly and carcass valuable.

Table 4: The least square means and standard error for tissue composition and characteristics of carcass by genetic group

Genetic group	Lean (%)	Fat (%)	Bone (%)	Carcass length	Longissimus muscle area
Afshari	49.32 ^a ±1.04	30.14 ^{ab} ±1.11	20.54±1.15	62.11±0.55	16.67±0.67
Fashandi	51.19 ^a ±1.04	26.15 ^b ±1.09	22.66±1.14	61.97±0.45	15.42±0.66
Zandi	48.44 ^b ±1.06	31.27 ^a ±1.11	20.29±1.15	60.85±0.54	16.11±0.69

^aThe different letter in each column show significantly different between means

Results in Table 4 show that the genetic group had no significant effect on this traits, however, Afshari lambs had better performance that correspond with more lean percentage in sampling area. Also the longissimus muscle area had least for Fshandi group that correspond with least loin percentage in this genetic group.

In the study of Jome (1993) on Shall and Zandi genetic group and crosses between them, the crossbred ram lamb carcass had higher lean than pure breeds. Olthof and Boylan (1991) shown that the effect of ram breed including Dorset, Lincoln and Ramboilet had no significant effect on longissimus muscle area when crossbred with Finnsheep ewes. Izadifard and Dadpasand (2007) shown that the positive effect of crossbreeding on longissimus muscle area. However, in current study the effect of breed of ram, the difference on body size and final feedlot weight can be affected the results.

CONCLUSION

The results show that crossbreeding had positive effect on growth and carcass Zandi breed sheep. The using of Afshari and Fashandi had improved effect on daily gain and FCR.

Also the terminal crossbreeding of Afshari ram with Zandi ewes improved on final feedlot weight, weight and efficiency of carcass, quality and composition of carcass and lower total fat resource significantly. It is important to obtain more information about crossbred performance by two-way crossbreeding system and economic output study can be evaluated in future studies.

REFERENCES

Al-Sabbagh, T., R.C. Malik, M.A. Razzaque and T. Abdullah, 1996. Carcass composition of Naeemi, texel, chios and naeemi x border leicester merino lambs. *Anim. Prod. Aust.*, 21: 155-157.

Altinel, A., M. Evrim, H. Gunes and M. Ozcan, 2001. Studies on the possibility to increase lamb meat production by commercial crossbreeding in Marmara Region. *Veteriner Fakultesi Dergisi*, 27: 495-500.

Azar, G.M., N.E. Jome, A. Salehi and A.A. Zadeh, 2007. Study of growth traits and and carcass characteristics of Shall and Zandi crossbreed lambs. *Proceedings of the 2th Congress of Iranian Animal Science and Aquatics*, May 15-16, Iran, pp: 1332-1337.

Cloete, J.J.E., S.W.P. Cloete, J.J. Olivier and L.C. Hoffman, 2007. Terminal crossbreeding of Dorper ewes to Ile de France, Merino Landsheep and SA Mutton Merino sires: ewe production and lamb performance. *Small Rumin. Res.*, 69: 28-35.

Elliss, M., G.M. Webster, B.G. Merrell and I. Brown, 1997. The influence of terminal sire breed on carcass composition and eating quality of crossbred lambs. *J. Anim. Sci.*, 64: 77-86.

Farid, A., 1991. Slaughter and carcass characteristics of three fat tailed sheep breeds and their crosses with Corriedale and Targhee. *Small Rumin. Res.*, 5: 255-271.

Gokdal, O., H. Ulker, F. Karakus, F. Cengiz, C. Temur and H. Handil, 2004. Growth, feedlot performance and carcass characteristics of Karakas and crossbred lambs (F1) (Ile de France Akkaraman (G1) Karakas) under rural farm conditions in Turkey. *South Africa J. Anim. Sci.*, 34: 223-232.

Hassan, H.A. and F.M.R. El-Feel, 1991. The effect of breed, level of feeding, age and slaughter weight on performance and carcass traits of lambs. *Egypt. J. Anim. Prod.*, 28: 255-265.

Huidobro, F. and J.J. Jurado, 1998. Meat production of crossbred Manchyga sheep. *Invest. Agraria Prod. Sanidad Anim.*, 4: 35-44.

Izadifard, J. and M. Dadpasand, 2007. The effect of crossbreeding on growth and carcass traits of Ghezel and Mehrban. *Proceedings of the 2th Congress of Iranian Animal Science and Aquatics*, May 15-16, Iran, pp: 1096-1099.

Jome, N.E., 1993. Study of feedlot performance and carcass traits of Shall and Zandi and crosses between them. *Iran. J. Agric.*, 24: 47-63.

Kashan, N.E.J., G.H.M. Azar, A. Afzalzadeh and A. Salehi, 2005. Growth performance and carcass quality of fattening lambs from fat tailed and tailed sheep breeds. *Small Rumin. Res.*, 60: 267-271.

- Makarechian, M., A. Farid and N. Sefidbankth, 1977. Lamb growth performance of Iranian fat tailed Karakul, Mehraban and Naeni breeds of sheep and their crosses with Corriedale and Targhee rams. *Anim. Prod.*, 25: 331-341.
- Newman, S., A. Reverter and D.J. Johnston, 2002. Purebred-crossbred performance and genetic evaluation of post weaning growth and carcass traits in *Bos indicus* *Bos taurus* crosses in Australia. *J. Anim. Sci.*, 80: 1801-1808.
- Nicoll, G.B., J.W. Skerrite, J.L. Dobbie and T.J. Grimwood, 1998. Effect of sire genotype on lamb growth and carcass productivity. *Sheep Prod.*, 58: 136-139.
- Nori, M.S. and S.S. Mansour, 1992. Principles of Sheep Breeding and Management. Ashrafi Publishing Organization, USA.
- Olthof, J.C. and W.J. Boylan, 1991. Carcass merit of market lambs from purebred and crossbred Finnsheep ewes. *Small Rumin. Res.*, 4: 159-173.
- Ozcan, M., A. Altinel, A. Yilmaz and V. Akgunduz, 2001. Studies on possibility of improving lamb production by two-way and three-way crossbreeding with German Black-Headed Mutton, Kivircik and Chios sheep breeds. 2. Fattening and carcass characteristics of lambs. *Turk. Veterinerlik Ve Hayvancilik Dergisi*, 25: 695-702.
- Ozcan, M., A. Yilmaz and M. Akgunduz, 2002. Investigations on improving the meat production of slaughter lambs by crossbreeding studies between Turkish Merino, Chios and Kivircik sheep breeds. 1. Fertility, lamb survival and growth of lambs. *Turk. Veterinerlik Ve Hayvancilik Dergisi*, 26: 517-523.
- Pour, M.E., 1998. Sheep Production. Ketabiran Publishing, Iran.
- Sunodo, C., M. Alfonso, A. Sanchez, R. Delfa and A. Teixeira, 2000. Carcass and meat quality in light lambs from different fat class in the EU Carcass classification system. *Meat Sci.*, 56: 89-94.