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Estimation of Growth Traits in Iranian Afshari Sheep Breed Under Rural Production System

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Abstract: In order to estimating body weight at different ages and pre and post average daily gain of Afshari sheep breed, the collected records by Jahad-e-Keshavarzi organization during 1994-2005 were used. Data were entered to excel and prepared for analysis by linear models using SPSS packages. Comparison of traits mean at different levels of fixed effects were done by Duncan procedure. The averages of Birth Weight (BW), Weaning Weight (WW) and body weight at 6th month of the ages (SW) were 3.26±0.072, 22.02±0.410 and 31.94±0.629 kg, respectively. The Average Daily Gain from birth to weaning (ADG1) and weaning to 6th month of the ages (ADG2) were also estimated 184.04±5.02 and 156.84±11.81 g, respectively. Effect of sex, birth type, birth years, birth months and flocks on BW were significant (p<0.01). Effect of sex, birth type, weighting year, weighting month and flocks on ADG2 were significant (p<0.01), but the birth type did not change ADG2 significantly.

Key words: Afshari sheep breed, body weight at different ages, average daily gain, WW, BW, SW

INTRODUCTION

Accurate exploitation of endemic sheep requires identify their productive and reproductive aptitudes and also breeding traits. Planning for accomplishment of breeding programs without having functional data for economical traits of a breed are not possible. Afshari sheep is one of the heavy and meat breeds in Iran and the growth and weight traits in different ages are the important economical traits of this breed, which must be considered in breeding program. Before making decision about designing and performing any new breeding plans, it is necessary to evaluate current breeding program then study on the growth traits of Afshari sheep breed is very important. Studies, which were done on performance of Afshari sheep in Iran were more focused on breeding conditions and hand feeding in intensive production system. In this rearing condition, the birth weight of Afshari sheep breed in male and female lambs were reported 4.3 and 4 kg and the estimates of weaning weight were 29.6 and 26.5 kg for male and female lambs, respectively (Monem et al., 2005).

The average daily gain of Afshari lambs from birth to weaning was estimated 177 g (Shahrebabak *et al.*, 2002).

In other studies, which were done on Kordi sheep breed, it was shown that the growth rate from weaning to 6 months of the ages was 82 g day⁻¹. In this breed, the weaning weight of lambs was 21.3 kg. The research, which were done on Kermani sheep breed showed that the 6 months weight of single, twin and triplet lambs were 23.37, 21.71 and 20.32 and it was 24.68 and 20.40 kg in male and female lambs. These studies were done on different breeding conditions specially fattening diet in intensive production system. Making decision about future program for Afshari sheep breeding requires comprehensive study on the current programs using available records, which collected in rural production system that is based on grazing in pasture in part of the year.

Because the body weight at different ages and daily growth rates are economic and important traits in Afshari sheep, the objectives of present study were the estimation of mentioned traits based on collected data in rural production system.

MATERIALS AND METHODS

Management and description of the breeding flocks and breed: The Afshari is a fat-tail, heavy and meat sheep

breed adapted to a wide range of harsh environmental conditions in Zanjan, Kordestan and West Azarbaijan provinces in Western Iran. About 1,000,000 head of this breed distributed in Mahneshan area at the Zanjan. The wool is coarse with medullation and suitable for carpet industry. Body size varies between 45 and 57 kg in adult ewes. The frequency of ewes lambing is only 65-75% and the rate of twin-born lambs 15-20%. Coat colour is mainly brown. In 1993, the ministry of agriculture in Iran has found it important to increase the efficiency of sheep production by improving of economic traits of them. The main aim of Afshari sheep breeding were selection for increasing body weight and uniformity of phenotypic characteristics such as brown coat colour and not horn. In early years of breeding program, about 22 rural flocks registered in program. The flocks were kept on pasture during spring, summer and early autumn. In the late autumn and Winter season, both lambs and ewes were given a ration composed of wheat and barley straw, dry alfalfa and some concentrate during pregnancy and the nursing period. Individual information, ewes lambing and body weights at the birth, weaning, 6, 9 and 12 months of the age were recorded. Because of some difficulties at the housing, mating of ewes and rams were not controlled and sire pedigree were not identified. In 2007, with designing suitable housing and application of artificial insemination, sire of the lambs were recorded.

Data and statistical methods: The data used in the present study, collected from the rural flocks by Jahad-e-Keshavarzi organization of Zanjan during 11 years (1994-2005) performing breeding programs and improving management of Afshari sheep breed different data files have been mixed with computer programs. These data includes 7291 birth weight records, 6787 weaning weight (100 days) records, 4061 six months weight, 4646 average daily gain from birth to weaning and 1755 average daily gain from weaning to 6 month of the ages. In order to remove the unacceptable data, the birth weights, which were <0.5 and >7 kg were removed and weaning weights, which were <10 and >30 kg. were omitted from data. In order to investigating, the effect of nongenetic factors such as birth type, sex, birth year, birth month, weighting year, weighting month and flock, the least square analysis with SPSS packages was used to test the significance of these factors. The interactions were not significant and therefore, excluded from the model, while the remaining fixed effects were included in the model. Comparison of traits mean at different levels of effective factors were done by Duncan procedure.

RESULTS AND DISCUSSION

Birth weight: The average of birth weight in all flocks were estimated 3.26±0.072 kg (Table 1), which it's quantity in male and female lambs was 3.37 and 3.14 kg. Difference between male and female birth weights was significant (p<0.01). Changes of birth weight during 1994-2005 indicates that the highest BW was 4.78 kg in 1994 and the lowest was 3.79 in 2003. The effect of birth year on birth weight was significant and its changes during consideration years was decreased. The effect of birth month on birth weight was also significant (p<0.01). The highest BW was in lambs, which were born on September (4.76 kg) and the lowest was the lambs, which were born on May (3.64 kg). The means of single, twin and triple lambs weight were estimated 4.2, 3.52 and 2.72 kg, respectively, which their differences were significant (p<0.01). The average birth weight of twin lambs was 84% of singles and BW of triplets was 64.7% of singles and 77% of twin lambs. Estimation of BW at different rural flocks indicated that the effect of flock on BW trait was significant (p<0.01). Among the flocks, which were considered, the highest BW was at flock with 6924 code. (5.14 kg) and the lowest was at 6921 (2.82 kg).

Weaning weight (day 100): Weaning weight mean in all studied flocks was estimated 22.02±0.41 kg (Table 2). This trait for male and female lambs was 22.54 and 21.52 kg, which their differences was significant (p<0.01). The effect of weighting year on weaning weight was significant (p<0.01). The consideration of weaning weight changes during years 1994-2005 indicates that the highest and the lowest wearing weight were in year 1995 (24.43 kg) and 1997 (19.26 kg), respectively. The effect of weighting month on weaning weight was significant (p<0.01). The highest WW was in lambs, which were born on July (24.58 kg) and the lowest was the lambs, which were born on April (21.51 kg). The means of single, twin and triplet lambs weaning weight were also estimated 21.94, 20.90 and 20.12 kg, which their differences were significant (p<0.01). Weaning weight of twin lambs was determined 95.3% of singles and WW of triplets was 91.71% of singles and 96.27% of twins. Comparison of WW means among 31 flocks in Zanjan province indicated that the effect of flocks on this trait were significant (p<0.01). Among the flocks, which was considered, the highest WW was in flock with 6937 code (25.71 kg) and the lowest was in 6915 (15.16 kg).

Sixth month weight: The average of body weight at the 6th month of the ages (SW) were estimated 31.94±0.629 kg

Table 1: Number of data (N), averages (μ) and Standard Errors (SE) of birth weight (kg) at different levels of fixed factors

Table 2: Number of data (N), averages (μ) and Standard Errors (SE) of weaning weight (kg) at different levels of fixed factors

weight (K	g) at different levels of fi	Acu lactors	wearing weigh	nt (kg) at different leve	is of fixed factors
Factor	N	μ±SE*	Factor	N	μ±SE*
Sex			Sex		
Male	3561	072.0±37.3°	Male	3073	414.0±54.22°
Female	3730	072.0±14.3 ^b	Female	3714	414.0±52.21 ^b
Birth year			Birth type		
1994	439	073.0±78.4ª	Single	5627	277.0±94.21°
1995	903	060.0±48.4 ^{sb}	Twin	1143	292.0 ± 90.20^{ab}
1996	654	064.0±07.4 ^{bcde}	Triplet	17	943.0±12.20 ^b
1997	3	375.0±33.4 ^{abcd}	Weighting month		
1999	75	097.0±40.4 ^{abc}	1	717	364.0±00.22 ^b
2000	285	071.0±87.3 ^{de}	2	4165	324.0±51.21 ^b
2001	985	061.0±95.3 ^{cde}	3	1485	332.0 ± 13.22^{b}
2002	1354	060.0±94.3 ^{cde} 059.0±80.3 ^e	4	39	851.0±47.24ª
2003 2004	1112 1477		5	16	982.0±58.24°
2004	4	$060.0\pm00.4^{\text{cde}}$ $330.0\pm00.4^{\text{cde}}$	6	32	988.0±74.21 ^b
	4	330.0±00.4**	11	160	610.0 ± 40.22^{b}
Birth type	5867	151.0±2.4°	12	173	506.0 ± 08.22^{b}
Single Twin	1403	057.0±52.3 ^b	Weighting year		
Triplet	21	054.0±72.2°	1994	152	882.0±91.19 ^g
Birth month	21	034.0±72.2	1995	200	833.0±43.24°
1	214	081.0±22.4bc	1996	498	421.0±27.21°
2	92	098.0±03.4 ^{cd}	1997	1267	398.0 ± 26.19^{h}
3	20	163.0±64.3°	1998	581	414.0±66.20 ^f
6	25	147.0±11.4 ^{cd}	1999	497	423.0±96.20°f
7	273	081.0±75.4ª	2000	662	415.0±35.22 ^d
8	338	078.0±34.4b	2001	271	443.0±43.23 ^b
9	496	074.0±99.3 ^d	2002	705	403.0±51.23b
10	3529	069.0±4 ^d	2003	744	409.0±24.23bc
11	1669	070.0 ± 00.4^{d}	2004	546	397.0±80.22 ^{cd}
12	635	073.0 ± 15.4^{bcd}	2005	664	408.0 ± 40.22^{d}
Flock			Flock		
6901	74	106.0 ± 83.3^{lmn}	6901	-	- 642 AT OO 22hs
6903	47	121.0±62.4bc	6903	62	643.0±88.23bc
6904	59	$113.0\pm49.4^{\text{bcdef}}$	6904 6905	112 196	556.0±99.17 ^m 532.0±96.21 ^{efghi}
6905	187	091.0±51.3°p	6906	330	475.0±71.20 ^{ij}
6906	330	$079.0\pm29.4^{\text{defgh}}$	6909	628	456.0±71.20 ⁹
6909	400	$078.0\pm39.4^{\text{cdefg}}$	6910	62	644.0±87.15 ⁿ
6910	6	272.0 ± 57.4^{bcd}	6911	79	738.0±31.18 ^{lm}
6911	378	082.0±22.4 ^{efghij}	6912	354	471.0±79.22 ^{cdefg}
6912	338	078.0±05.4hijklm	6913	39	736.0±34.19 ^{kl}
6913	6	272.0±70.4 ^b	6914	58	655.0±37.18 ^{lm}
6914	8	239.0±42.4 ^{bcdef}	6915	91	608.0±16.15 ⁿ
6915	91	105.0±29.3 ^p	6916	142	536.0±86.18lm
6916	129	095.0±07.4 ^{hijkl}	6917	364	471.0±96.21efghi
6917	271	081.0±75.3mno	6918	249	490.0±14.19 ^{klm}
6918	115	093.0±23.3°	6919	486	444.0±08.23cdefg
6919	630	074.0±33.3°	6921	-	-
6921	389	078.0±82.2 ^q	6921	566	446.0±57.22 ^{cdefgh}
6922	47	121.0±83.3 ^{lmn}	6923	413	463.0±16.22efgh
6923	438	076.0±19.4 ^{fghijk} 081.0±14.5 ^a	6924	375	529.0±32.23°de
6924 6925	580 469	076.0±44.4 ^{bcdef}	6925	517	460.0±17.23 ^{cdef}
6926	269	082.0±64.4 ^{bc}	6926	477	$469.0\pm86.21^{\mathrm{fghi}}$
6928	521	077.0±50.4 ^{bcde}	6928	333	482.0±94.22cdefg
6929	310	080.0±94.3jklmn	6929	274	492.0±35.21 hij
6930	440	074.0±03.4hijklm	6930	155	511.0±35.21hij
6931	175	085.0±96.3ijklm	6931	16	027.0±72.21ghi
6932	261	082.0±65.3 ^{no}	6932	161	528.0±35.21hij
6934	49	117.0±12.4ghijkl	6934	23	900.0±01.25ab
6935	125	092.0±91.3klmn	6935	62	653.0±48.22 ^{de fgh}
6936	76	104.0±34.3 ^p	6936	36	783.0±85.22 ^{cdefg}
6937	73	105.0±25.4efghi	6937	48	707.0±71.25°
Total	7291	072.0±26.3	Total	6787	410.0 ± 02.22

The levels which have common letters was not significant

(Table 3). This trait in male and female lambs were 33.49 and 30.38 kg. Differences between male and female SW

The levels which have common letters was not significant

was significant (p<0.01). The effect of weighting year on SW was also significant (p<0.01). The consideration of

Table 3: Number of data (N), Average (μ) and standard Error (SE) of 6 month weight (kg) on different levels of identified factors

Factor	N	μ±SE*
Sex		μ-52
Male	1807	633.0±49.33°
Female	2254	636.0±38.30 ^b
Birth type		
Single	3361	348.0±91.32°
Twin	689	391.0±09.31ab
Triplet	11	607.1±04.30 ^b
Weighting month		
1	51	164.1±54.31bc
2	68	198.1±19.34°
3	118	831.0±26.34°
4	1024	606.0±06.33 ^{ab}
5	2449	582.0±48.32bc
6	319	708.0±14.31°
7	32	161.1±68.32abc
Weighting year		
1995	44	486.1 ± 95.32^{ab}
1996	234	003.1±86.33°
1997	998	647.0 ± 83.31^{bc}
1998	452	694.0±02.34ª
1999	61	964.0±90.33°
2000	262	723.0±62.31°
2001	209	722.0 ± 50.32^{bc}
2002	544	670.0±97.32 ^{sb}
2003	330	707.0±74.31°
2004	458	663.0±76.33°
2005	469	658.0±61.31°
Flock		
6901	125	$834.0\pm80.31^{\text{ghijk}}$
6903	10	769.1±64.40°
6904	39	076.1 ± 69.24^{m}
6905	194	$780.0\pm06.37^{\text{bcd}}$
6906	89	846.0±64.28 ¹
6908	2	709.3±23.37bc
6909	472	672.0 ± 68.30^{jkl}
6910	41	046.1 ± 62.28^{1}
6911	86	115.1±49.35 ^{bcde}
6912	280	712.0±28.34 ^{cdefgh}
6913	40	$053.1\pm29.32^{\text{fghijk}}$
6914	41	047.1 ± 00.31^{ijkl}
6916	50	988.0±29.28 ¹
6917	175	741.0±52.34 ^{bcdefg}
6918	97	818.0±04.30 ^{kl}
6919	541	661.0±03.35bcdef
6920	32	141.1±98.30 ^{ijkl}
6921	366	678.0±84.30 ^{jkl}
6923	224	731.0±97.32efghijk
6924	144	041.1±68.33efghij
6925	217	725.0±55.28 ¹
6926	129	803.0±17.35 ^{bcdef}
6928	89	869.0±51.37 ^b
6929	204	752.0±31.31 hijkl
6930	72 24	869.0±04.34 ^{defghi}
6931	24	248.1±78.34 ^{bcdefg}
6932	67	912.0±49.32efghijk
6934	19	395.1±12.34 ^{defg}
6935	77	904.0±87.29 ^{kl}
6936	49	087.1±20.30 ^{kl}
6937	66	980.0±61.32efghijk
Total	4061	629.0±94.31

The levels which have common letters was not significant

SW changes during years 1994-2005 showed that the highest SW was on year 1998 (34.02 kg) and the lowest was in year 2005 (31.61 kg). The effect of weighting

month on SW was also significant (p<0.01). The highest SW was in lambs which were born on May (34.26 kg) and the lowest was at the lambs, which were born on August (31.14 kg). The means of single, twin and triplet lambs SW were estimated 32.91, 31.09 and 30.04 kg, which their differences were significant (p<0.01). Based on estimated means, then the average SW of twin lambs was 94.47% of singles and SW of triplet was 91.28% of singles and 96.62% of twins. SW means comparison indicated that the effect of flock on SW trait was significant (p<0.01), so that the highest SW was in flock with 6903 code (40.64 kg) and the lowest was in 6904 (24.69 kg).

Average daily gain from birth to weaning: The Average Daily Gain from birth to weaning (ADG1) in all flocks was estimated 184.04±5.02 g (Table 4). The effects of flock, weighting year, weighting month, sex and birth type on ADG1 was significant (p<0.01). The highest daily gain was in flock number 6919 (259.84 g), weighting year of 2003 (217.45 g) and weighting month of February (243.70 g). The lowest ADG1 was also in flock number 6915 (117.16 g), weighting year of 1996 (161.67 g) and weighting month of September (176.8 g). This trait in male and female lambs were 190.38 and 177.69 g and at the single, twin and triplet lambs were estimated 205.61, 192.61 and 182.03 g.

Average daily gain from weaning to 6th month of the age:

The Average Daily Gain from weaning to 6th month of the ages (ADG2) was estimated 156.84±11.81 g (Table 5). The effects of flock, weighting year, weighting month and sex on ADG2 were significant (p<0.01) but the effect of birth type was not significant. The maximum ADG2 was at the flock with number 6911 (216.87 g), weighting year of 1996 (167.57 g) and weighting month of March (244.0 g). The lowest ADG2 was in flock number 6925 (61.46 g), weighting year of 2004 (86.19 g) and weighting month of February (99.28 g). This trait in the male and female lambs were 163.06 and 150.63 g, respectively. ADG2 for single, twin and triplet lambs were also estimated 113.15, 111.65 and 100.54 g.

Because of no information about growth traits of Afshari sheep breed under rural production system, comparison of these results with literature is not possible. Also some country reports about growth traits of this breed were at the intensive rearing condition, while obtained results at the different production system are not comparable. However, Blak (1983) in his researches have found that the average birth weight in twin lambs were 80% of singles birth weight (whereas, in this study this rate was estimated 84%) and triplet lambs birth weight were 77% from twins birth weight. The weaning weight of

West African sheep breed was estimated 10.76±2.27 kg (Musa *et al.*, 2005). In the other study, average daily gain in Awassi sheep breed from birth to weaning was

Table 4: Number of data (N), Average (μ) and standard Error (SE) of Daily gain from birth to weaning (kg) on different levels of identified factors

Factor N μ±SE ⁵ Sex Male 2206 07.5±38.190 ^h Fernale 2440 07.5±69.177 ^b Weighting year 1994 291 56.7±75.201 ^h 1995 481 39.5±09.176 ^c 1996 428 81.5±67.161 ^d 1999 60 36.8±13.180 ^o 2000 198 32.6±98.216 ^c 2001 755 32.5±32.212 ^s 2002 915 23.5±78.208 ^a 2003 636 35.5±45.217 ^s 2004 882 30.5±69.212 ^s Birth type Single 3764 47.3±61.205 ^s Triplet 20 44.1±03.181 ^s Weighting month 1 48 50.9±50.218 ^b 2 19 26.13±42.199 ^c 6 10 24.16±90.196 ^b 7 168 39.6±80.176 ^c 8 165 07.6±55.202 ^b 9 295 97.4±79.197 ^{bc} 11 1156 31.4±10.210 ^b 12 290 06.5±70.243 ^s Flock Flo	factors		
Male	Factor	N	μ±SE ^a
Female	Sex		
Weighting year 1994 291	Male	2206	07.5±38.190°
1994 291 56.7±75.201b 1995 481 39.5±09.176° 1996 428 81.5±67.161° 1999 60 36.8±13.180° 2000 198 32.6±98.216° 2001 755 32.5±32.212° 2002 915 23.5±78.208° 2003 636 35.5±45.217° 2004 882 30.5±69.212° Birth type Single 3764 47.3±61.205° Triplet 20 44.11±03.18b° Weighting month 1 48 50.9±50.218° 2 19 26.13±42.199° 2 19 26.13±42.199° 2 10 24.16±90.196° 7 168 39.6±80.176° 8 165 07.6±55.202° 9 295 97.4±79.197b° 10 2495 18.4±32.197b° 11 1156 31.4±10.210° 12 290 06.5±70.243° Flock 6901 13 59.14±15.203±6½ 12 290 06.5±70.243° Flock 6901 13 59.14±15.203±6½ 6903 39 52.9±85.178½ 6904 52 72.8±84.139½ 6905 122 58.7±68.187±6½ 6909 322 71.5±75.173½ 6910 6 49.20±40.158½ 6911 80 67.7±14.145¹ 6911 80 67.7±14.145¹ 6912 263 81.5±04.205±6½ 6914 7 09.19±30.140½ 6915 65 69.8±16.117° 6916 114 22.7±13.149¹ 6917 202 08.6±56.209½ 6918 87 34.7±66.205±6½ 6919 355 58.5±48.259° 6921 224 95.5±75.244± 6923 326 62.5±50.181€½ 6919 355 58.5±48.259° 6921 224 95.5±75.244± 6923 326 62.5±50.181€½ 6919 355 58.5±48.259° 6921 224 95.5±75.244± 6923 326 62.5±50.181€½ 6929 284 88.5±66.177½ 6930 248 76.5±51.236±6 6931 17 83.12±96.1826½ 6931 17 83.12±96.1826½ 6932 173 31.6±16.210° 6933 18.5±46.117□ 6934 38 53.9±3.246° 6935 78 61.7±51.211° 6936 48 78.8±75.220° 6937 67 01.8±25.235±c	Female	2440	07.5±69.177 ^b
1995	Weighting year		
1996	1994	291	56.7±75.201 ^b
1999 60 36.8±13.180° 2000 198 32.6±98.216° 2001 755 32.5±32.212° 2002 915 23.5±78.208° 2003 636 35.5±45.217° 2004 882 30.5±69.212° Birth type Single 3764 47.3±61.205° Triplet 20 44.11±03.18b° Weighting month 1 48 50.9±50.218° 2 19 26.13±42.199° 6 10 24.16±90.199° 7 168 39.6±80.176° 8 165 07.6±55.202° 9 295 97.4±79.197° 10 2495 18.4±32.197° 11 1156 31.4±10.210° 12 290 06.5±70.243° Flock 6901 13 59.14±15.203*efghi 6903 39 52.9±85.178\bighi 6904 52 72.8±84.139\bight 6906 236 98.5±54.192*efghi 6909 322 71.5±75.173\bight 6910 6 49.20±40.158\bight 6911 80 67.7±14.145\bight 6912 263 81.5±04.205*efghi 6914 7 09.19±30.140\bight 6915 65 69.8±16.117\bight 6916 114 22.7±13.149¹ 6917 202 08.6±56.209*eff 6919 355 58.5±84.259° 6924 408 93.5±11.209*ef 6925 250 89.5±63.207*efg 6929 284 88.5±66.177\bight 6930 248 76.5±51.210*efg 6929 284 88.5±66.177\bight 6931 17 83.1±296.183*efg 6929 284 88.5±66.177\bight 6931 17 83.1±296.183*efg 6929 284 88.5±66.177\bight 6931 17 83.1±296.182*efg 6929 284 88.5±65.199*efg 6931 17 83.1±296.182*efg 6932 346 62.5±56.189*efg 6933 349 85.5±45.191*efg 6934 38 35.9±3.246° 6935 78 61.7±12.11*eb 6936 48 78.8±75.220*ef 6937 67 01.8±25.235*ec	1995	481	39.5±09.176°
2000	1996	428	81.5±67.161 ^d
2001 755 32.5±32.212* 2002 915 23.5±78.208*b 2003 636 35.5±45.217* 2004 882 30.5±69.212* Birth type Single 3764 47.3±61.205* Twin 862 81.3±61.192*b Triplet 20 44.11±03.18b* Weighting month 1 48 50.9±50.218* 2 19 26.13±42.199* 6 10 24.16±90.196*c 7 168 39.6±80.176* 8 165 07.6±55.202* 9 295 97.4±79.197*c 10 2495 18.4±32.197*c 11 1156 31.4±10.210* 12 290 06.5±70.243* Flock 6901 13 59.14±15.203**ξhia 6903 39 52.9±85.178*hip 6904 52 72.8±81.139*b 6906 236 98.5±54.192*ξhia 6909 322 71.5±75.173*b 6911 80 67.7±14.145¹ 6912 263 81.5±04.205*dhighi 6913 6 51.20±50.181*ship 6914 7 09.19±30.140*m 6915 65 698±16.117*m 6916 114 22.7±13.149¹ 6919 355 88.±84.259* 6924 408 93.5±11.209*d 6925 292 49.5±75.244*b 6921 224 95.5±75.244*b 6912 249 95.5±75.244*b 6913 36 6 51.20±50.181*ship 6914 7 09.19±30.140*m 6915 65 69.8±16.117*m 6916 114 22.7±13.149¹ 6919 355 58.5±84.259* 6924 408 93.5±11.209*d 6925 250 89.5±63.209*d 6926 167 42.6±28.212*o 6928 349 85.5±75.244*b 6929 284 88.5±66.177*jk 6930 248 76.5±51.21*o 6931 17 83.12±96.182*ghip 6932 173 31.6±16.210*b 6934 38 33.9±93.246* 6935 78 61.7±51.21*o 6936 937 67 01.8±25.235*bc	1999	60	36.8±13.180°
2002	2000	198	
2003	2001	755	32.5±32.212a
2004 882 30.5±69.212* Birth type	2002	915	23.5±78.208ab
Single 3764	2003	636	35.5±45.217 ^a
Single	2004	882	30.5±69.212°
Twin 862 81.3±61.192 ^{ab} 44.11±03.18b ^a Weighting month 1	Birth type		
Triplet 20 44.11±03.18b³ Weighting month 1 48 50.9±50.218b² 2 19 26.13±42.199b² 6 10 24.16±90.196b² 7 168 39.6±80.176c³ 8 165 07.6±55.202b³ 9 295 97.4±79.197bc² 10 2495 18.4±32.197bc² 11 1156 31.4±10.210b² 12 290 06.5±70.243a³ Flock 6901 13 59.14±15.203bafghi 6903 39 52.9±85.178hijh² 6904 52 72.8±84.139²m² 6906 236 98.5±54.192afghi 6909 322 71.5±75.173lh² 6910 6 49.20±40.158bl³ 6911 80 67.7±14.145¹ 6912 263 81.5±04.205³afghi 6913 6 51.20±50.1818²hijk² 6914 7 09.19±30.140b²n² 6915 65 69.8±16.117²m² 6916 114 22.7±13.149¹ 6917 202 08.6±56.209²af² 6918 87 34.7±96.203²afghi 6919 355 88.5±84.259² 6921 224 95.5±75.244ab² 6922 6928 349 85.5±51.20ab²af 6930 248 76.5±51.236bc² 6931 17 83.12±96.182bijk² 6932 173 31.6±16.210²b²af 6933 48 53.9±3.246² 6934 38 53.9±3.246² 6935 78 61.7±51.211°cb²af 6936 48 78.8±75.220bcd 6937	Single	3764	47.3±61.205°
Weighting month	Twin	862	81.3±61.192 ^{ab}
1	Triplet	20	44.11±03.18ba
2 19 26.13±42.199 ^b 6 10 24.16±90.196 ^{bc} 7 168 39.6±80.176 ^c 8 165 07.6±55.202 ^b 9 295 97.4±79.197 ^{bc} 10 2495 18.4±32.197 ^{bc} 11 1156 31.4±10.210 ^b 112 290 06.5±70.243 ^a Flock 6901 13 59.14±15.203 ^{dcfghi} 6903 39 52.9±85.178 ^{hijk} 6905 122 58.7±68.187 ^{afghi} 6906 236 98.5±54.192 ^{cfghi} 6909 322 71.5±75.173 ^{jk} 6910 6 49.20±40.158 ^{ll} 6911 80 67.7±14.145 ^l 6912 263 81.5±04.205 ^{dcfghi} 6914 7 09.19±30.140 ^{lm} 6915 65 69.8±16.117 ^m 6916 114 22.7±13.149 ^l 6917 202 08.6±56.209 ^{dcfghi} 6918 87 34.7±96.203 ^{dcfghi} 6919 355 58.5±84.259 ^a 6921 224 95.5±75.244 ^b 6923 326 62.5±56.189 ^{cfghi} 6924 408 93.5±11.209 ^{bcf} 6926 167 42.6±28.212 ^{cdc} 6928 349 85.5±45.191 ^{cfghi} 6929 284 88.5±66.177 ^{ijk} 6930 248 76.5±51.236 ^{dbc} 6931 17 83.12±96.189 ^{cfghi} 6929 284 88.5±66.177 ^{ijk} 6930 248 76.5±51.236 ^{dbc} 6931 17 83.12±96.189 ^{cfhijk} 6932 173 31.6±16.210 ^{dbc} 6934 38 53.9±93.246 ^c 6935 78 61.7±51.211 ^{cdbc} 6936 48 78.8±75.220 ^{bcd} 6937 67 01.8±25.235 ^{dbc}	Weighting month		
6 10 24.16±90.196 bc 7 168 39.6±80.176 c 8 165 07.6±55.202 b 9 295 97.4±79.197 bc 10 2495 18.4±32.197 bc 11 1156 31.4±10.210 b 12 290 06.5±70.243 s Flock 6901 13 59.14±15.203 de fighi 6903 39 52.9±85.178 lipk 6904 52 72.8±84.139 lm 6905 122 58.7±68.187 efshij 6906 236 98.5±54.192 efshij 6909 322 71.5±75.173 lk 6910 6 49.20±40.15 8 ll 6911 80 67.7±14.145 l 6912 263 81.5±04.205 be fighi 6913 6 51.20±50.181 ls lipk 6914 7 09.19±30.140 lm 6915 65 69.8±16.117 lm 6916 114 22.7±13.149 l 6917 202 08.6±56.209 lef 6918 87 34.7±96.203 left lpi 6921 2			50.9±50.218b
7	2	19	26.13±42.199 ^b
8 165 07.6±55.202 ^b 9 295 97.4±79.197 ^{bc} 10 2495 18.4±32.197 ^{bc} 11 1156 31.4±10.210 ^b 112 290 06.5±70.243 ^a Flock 6901 13 59.14±15.203 ^{dc-fghi} 6903 39 52.9±85.178 ^{hijk} 6904 52 72.8±84.139 ^{lm} 6905 122 58.7±68.187 ^{efghij} 6906 236 98.5±54.192 ^{efghij} 6909 322 71.5±75.173 ^{jk} 6910 6 49.20±40.158 ^{kl} 6911 80 67.7±14.145 ^l 6912 263 81.5±04.205 ^{dc-fghi} 6913 6 51.20±50.181 ^{g-hijk} 6914 7 09.19±30.140 ^{lm} 6915 65 69.8±16.117 ^m 6916 114 22.7±13.149 ^l 6917 202 08.6±56.209 ^{def} 6918 87 34.7±96.203 ^{defghi} 6919 355 58.5±84.259 ^k 6921 224 95.5±75.244 ^{dc} 6923 326 62.5±56.189 ^{efghijk} 6924 408 93.5±11.209 ^{def} 6926 167 42.6±28.212 ^{cdc} 6928 349 85.5±45.191 ^{efghijk} 6929 284 88.5±66.177 ^{ijk} 6930 248 76.5±51.236 ^{doc} 6931 17 83.12±96.182 ^{efghijk} 6932 173 31.6±16.210 ^{de} 6933 38 53.9±93.246 ^k 6934 38 53.9±93.246 ^k 6935 78 61.7±51.211 ^{cdc} 6936 48 78.8±75.220 ^{kcd} 6937 67 01.8±25.235 ^{doc}	6	10	24.16±90.196 [∞]
9 295 97.4±79.197bc 10 2495 18.4±32.197bc 11 1156 31.4±10.210b 12 290 06.5±70.243a Flock 6901 13 59.14±15.203dafghi 6903 39 52.9±85.178*iiik 6904 52 72.8±84.139*iii 6906 236 98.5±54.192*iikii 6909 322 71.5±75.173*ik 6910 6 49.20±40.158*ii 6911 80 67.7±14.145¹ 6912 263 81.5±04.205*dafghi 6913 6 51.20±50.1818*iiik 6914 7 09.19±30.140*iii 6915 65 69.8±16.117*ii 6916 114 22.7±13.149¹ 6917 202 08.6±56.209*def 6918 87 34.7±96.203*defghi 6919 355 58.5±84.259* 6921 224 95.5±75.244*d 6923 326 62.5±56.180*defi 6924 408 93.5±11.209*def 6926 167 42.6±28.212*cde 6928 349 85.5±45.191*defi 6930 248 76.5±51.236*doc 6931 17 83.12±96.182*fehij 6932 173 31.6±16.210*de 6933 167.±51.211*da 6936 48 78.8±75.20*bc 6936 6937 67 01.8±25.235*doc	7	168	39.6±80.176°
10 2495 18.4±32.197bc 11 1156 31.4±10.210b 12 290 06.5±70.243a Flock 6901 13 59.14±15.203dafghi 6903 39 52.9±85.178\text{laipk} 6904 52 72.8±84.139\text{laipk} 6905 122 58.7±68.187\text{laipk} 6909 322 71.5±75.173\text{laipk} 6909 322 71.5±75.173\text{laipk} 6910 6 49.20±40.158\text{laipk} 6911 80 67.7±14.145\text{laipk} 6912 263 81.5±04.205\text{daipk} 6913 6 51.20±50.181\text{laipk} 6914 7 09.19±30.140\text{laipk} 6915 65 69.8±16.117\text{laipk} 6916 114 22.7±13.149\text{laipk} 6917 202 08.6±56.209\text{laipk} 6918 87 34.7±96.203\text{laipk} 6919 3555 58.5±84.259\text{laipk} 6921 224 95.5±75.244\text{laipk} 6923 326 62.5±56.189\text{laipk} 6924 408 93.5±11.209\text{laipk} 6925 250 89.5±63.207\text{laipk} 6926 167 42.6±28.212\text{laipk} 6929 284 88.5±66.177\text{laipk} 6930 248 76.5±51.23\text{laipk} 6931 17 83.12±96.182\text{laipk} 6932 173 31.6±16.210\text{laipk} 6933 48 78.8±75.20\text{laipk} 6934 38 53.9±93.246\text{laipk} 6935 78 61.7±51.211\text{laipk} 6936 48 78.8±75.20\text{laipk} 6937 67 01.8±25.235\text{laipk} 6938	8	165	07.6±55.202 ^b
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	9	295	97.4±79.197 ^{bc}
12 290 06.5±70.243° Flock 6901 13 59.14±15.203 ^{defghi} 6903 39 52.9±85.178 ^{lijk} 6904 52 72.8±84.139 ^{lin} 6905 122 58.7±68.187° ^{ghij} 6906 236 98.5±54.192° ^{ghij} 6909 322 71.5±75.173 ^{jk} 6910 6 49.20±40.158 ^{li} 6911 80 67.7±14.145 ^l 6912 263 81.5±04.205 ^{defghi} 6913 6 51.20±50.1818 ^{laijk} 6914 7 09.19±30.140 ^{lin} 6915 65 69.8±16.117 ^{lin} 6916 114 22.7±13.149 ^l 6917 202 08.6±56.209 ^{def} ghi 6918 87 34.7±96.203 ^{defghi} 6919 355 58.5±84.259° 6921 224 95.5±75.244 ^{la} 6923 326 62.5±56.189° ^{flajik} 6924 408 93.5±11.209 ^{def} g 6925 250 89.5±63.207 ^{defg} g 6926 167 42.6±28.212 ^{logh} 6929 284 88.5±66.177 ^{lijk} 6930 248 76.5±51.23 ^{dbo} c 6931 17 83.12±96.182 ^{flajik} 6932 173 31.6±16.210 ^{def} g 6933 38 53.9±93.246° 6935 78 61.7±51.211 ^{logh} 6936 48 78.8±75.220 ^{logd} 6937 67 01.8±25.235 ^{logc}	10	2495	18.4±32.197 ^{bc}
Flock 6901 13 59.14±15.203 ^{de fighi} 6903 39 52.9±85.178 ^{hijk} 6904 52 72.8±84.139 ^{lim} 6905 122 58.7±68.187 ^{e fighij} 6906 236 98.5±54.192 ^{e fighij} 6909 322 71.5±75.173 ^{lk} 6910 6 49.20±40.158 ^{lk} 6911 80 67.7±14.145 ^l 6912 263 81.5±04.205 ^{defighi} 6913 6 51.20±50.1818 ^{kinjk} 6914 7 09.19±30.140 ^{lim} 6915 65 69.8±16.117 ^{lim} 6916 114 22.7±13.149 ^l 6917 202 08.6±56.209 ^{def} 6918 87 34.7±96.203 defighi 6919 355 58.5±84.259 ^s 6921 224 95.5±75.244 de 6923 326 62.5±56.189 defini 6924 408 93.5±11.209 def 6925 250 89.5±63.207 defig 6926 167	11	1156	31.4±10.210 ^b
6901 13 59.14±15.203 ^{de/ghi} 6903 39 52.9±85.178 ^{hijk} 6904 52 72.8±84.139 ^{lm} 6905 122 58.7±68.187 ^{e/ghij} 6906 236 98.5±54.192 ^{e/ghij} 6909 322 71.5±75.173 ^{jk} 6910 6 49.20±40.158 ^{lk} 6911 80 67.7±14.145 ^l 6912 263 81.5±04.205 ^{le/ghi} 6913 6 51.20±50.1818 ^{lhijk} 6914 7 09.19±30.140 ^{lm} 6915 65 69.8±16.117 ^m 6916 114 22.7±13.149 ^l 6917 202 08.6±56.209 ^{lef} 6918 87 34.7±96.203 ^{lef/ghi} 6919 355 58.5±84.259 ^s 6921 224 95.5±75.244 ^{lef/ghij} 6924 408 93.5±11.209 ^{lef/ghij} 6925 250 89.5±63.207 ^{lef/ghij} 6926 167 42.6±28.212 ^{e/ghij} 6929 284 88.5±66.177 ^{lik} 6930 248 76.5±51.236 ^{lef/ghij} 6932 173 31.6±16.210 ^{lef/ghij} 6935 78 61.7±51.211 ^{e/ghij} 6936 48 78.8±75.220 ^{lef/ghij} 6937 67 01.8±25.235 ^{lef/ghij} 6938 38.5±75.20 ^{lef/ghijk}	12	290	06.5±70.243°
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Flock		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6901	13	59.14±15.203 ^{defghi}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6903	39	52.9 ± 85.178^{hijk}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6904	52	72.8 ± 84.139^{lm}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6905	122	58.7 ± 68.187 efghij
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6906	236	98.5±54.192 ^{efghij}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6909	322	71.5 ± 75.173^{jk}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6910	6	49.20 ± 40.158^{kl}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6911	80	67.7±14.145 ¹
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6912	263	81.5±04.205 ^{defghi}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6913	6	51.20±50.181ghijk
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6914	7	09.19 ± 30.140^{lm}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6915	65	69.8±16.117 ^m
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6916	114	22.7±13.149 ¹
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6917	202	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6918	87	$34.7 \pm 96.203^{\text{defghi}}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6919	355	58.5±84.259°
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6921	224	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6923	326	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6924		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6925	250	$89.5\pm63.207^{\text{defg}}$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6926	167	42.6±28.212 ^{cde}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6928	349	85.5±45.191 efghij
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6929	284	88.5 ± 66.177^{ijk}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6930	248	76.5±51.236 ^{abc}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6931	17	83.12 ± 96.182^{fghijk}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6932	173	31.6 ± 16.210^{de}
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6934	38	53.9±93.246°
6937 67 01.8±25.235 ^{abc}	6935	78	61.7±51.211 cde
	6936	48	78.8±75.220 ^{bcd}
Total 4646 02.5±03.184	6937	67	01.8±25.235abc
	Total	4646	02.5±03.184

The levels, which have common letters was not significant

Table 5: Number of data (N), Average (μ) and standard Error (SE) of Daily gain from weaning to six month (kg) on different levels of identified factors

identified factors		
Factor	N	μ±SEª
Sex		
Male	3561	072.0±37.3°
Female	3730	072.0±14.3 ^b
Birth year		
1994	439	073.0±78.4ª
1995	903	060.0±48.4 ^{ab}
1996	654	064.0±07.4 ^{bcde}
1997	3 75	375.0±33.4abcd
1999 2000	285	097.0±40.4 ^{abc} 071.0±87.3 ^{de}
2001	985	061.0±95.3 ^{cde}
2002	1354	060.0±94.3 ^{cde}
2003	1112	059.0±80.3°
2004	1477	060.0±00.4 ^{cde}
2005	4	330.0±00.4 ^{cde}
Birth type	·	22010 0011
Single	5867	151.0±2.4a
Twin	1403	057.0±52.3b
Triplet	21	054.0±72.2°
Birth month		
1	214	081.0±22.4bc
2	92	098.0 ± 03.4^{cd}
3	20	163.0±64.3e
6	25	147.0±11.4 ^{cd}
7	273	81.0±75.4°
8	338	78.0±34.4 ^b
9	496	74.0±99.3 ^d
10	3529	69.0±4 ^d
11	1669	70.0 ± 00.4^{d}
12	635	73.0±15.4 ^{bcd}
Flock		,
6901	74	106.0±83.3 ^{lmn}
6903	47	121.0±62.4 ^{bc}
6904	59	113.0±49.4 ^{bcdef}
6905	187	091.0±51.3 ^{op}
6906	330	079.0±29.4 ^{defgh}
6909	400	$078.0\pm39.4^{\text{cdefg}}$ $272.0\pm57.4^{\text{bcd}}$
6910 6911	6 378	082.0±22.4efghij
6912	338	078.0±05.4hijklm
6913	556	272.0±70.4 ^b
6914	8	239.0±42.4bcdef
6915	91	105.0±29.3 ^p
6916	129	095.0±07.4 ^{hijkl}
6917	271	081.0±75.3 ^{mno}
6918	115	093.0±23.3 ^p
6919	630	074.0±33.3p
6921	389	078.0 ± 82.2^{q}
6922	47	121.0 ± 83.3^{lmn}
6923	438	076.0 ± 19.4^{fghijk}
6924	580	081.0±14.5a
6925	469	$076.0\pm44.4^{\text{bcdef}}$
6926	269	082.0 ± 64.4^{bc}
6928	521	$077.0 \pm 50.4^{\text{bcde}}$
6929	310	080.0 ± 94.3^{jklmn}
6930	440	074.0±03.4hijklm
6931	175	085.0 ± 96.3^{ijklm}
6932	261	082.0±65.3 ^{no}
6934	49	117.0±12.4ghijkl
6935	125	092.0 ± 91.3^{klmn}
6936	76	104.0±34.3 ^p
6937	73	105.0±25.4efghi
Total	7291	72.0±26.3

The levels, which have common letters was not significant

248±0.07 kg (Shaker *et al.*, 2002). The mean and standard deviation of birth weight, 3, 4, 6, 9 and 12 months weight in Kordish sheep breed of North Khurasan were 4.3±0.7, 21.4±4, 26.1±5, 29.1±6 and 39.02±8 kg, respectively (Nasiri and Froozanmehr, 2002). Weaning weight of male and female Kermani sheep breed was recorded 21.34±0.074 and 16±1.20 kg (Shodja *et al.*, 2002). In another research, the effect of flock on weaning weight in Djallonke sheep breed (Gallivan *et al.*, 1993) and Moroccan sheep breed (Bourfia and Touchberry, 1993) was not significant.

Musa et al. (2005) have reported that the weaning weight of West African sheep breed is about 10.76±2.27 kg. Yilmaz et al. (2007) in their research showed that single lambs weight at the 180 days of age were heavier than lambs born as twins at birth by 2.3 kg that is 0.48 kg higher than 1.82 at the present study. Maxa et al. (2007) in their research have reported that average daily gain from birth to 2 months of the ages was 281-333 g. Sinha and Singh (1997) have reported that average daily gain from 3-6 months in Mozafarnagry sheep breed was 92.5±3.2 g, this amount is less than daily gain from 3-6 months of the ages in Afshari sheep breed (156.85 g).

CONCLUSION

Comparison of obtained results in present study with literature and having high variation in the afshari population indicate that Afshari sheep breed has potential to improvement for growth traits and this breed is one of the good meet breeds in Iran. Also, in the future for designing breeding plan, it is important to include some of these traits in the Afshari sheep breeding goal.

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