Journal of Animal and Veterinary Advances 8 (7): 1449-1454, 2009
ISSN: 1680-5593

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 WW, SW and ADG1 were also significant ($p<0.01$). Effect of sex, 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

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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 weaning 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

Factor	N	μ±SE*
Sex		
Male	3561	072.0±37.3^{a}
Female	3730	072.0±14.3^{b}
Birth year		
1994	439	073.0±78.4^{a}
1995	903	060.0±48.4^{ab}
1996	654	064.0±07.4^{bcde}
1997	3	375.0±33.4^{abcd}
1999	75	097.0±40.4^{abc}
2000	285	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^{e}
2004	1477	060.0±00.4^{cde}
2005	4	330.0±00.4^{cde}
Birth type		
Single	5867	151.0±2.4^{a}
Twin	1403	057.0±52.3^{b}
Triplet	21	054.0±72.2^{c}
Birth month		
1	214	081.0±22.4^{bc}
2	92	098.0±03.4^{cd}
3	20	163.0±64.3^{e}
6	25	147.0±11.4^{cd}
7	273	081.0±75.4^{a}
8	338	078.0±34.4^{b}
9	496	074.0±99.3^{d}
10	3529	069.0±4^{d}
11	1669	070.0±00.4^{d}
12	635	073.0±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±39.4^{cdefg}
6910	6	272.0±57.4^{bcd}
6911	378	082.0±22.4^{efghij}
6912	338	078.0±05.4^{hijklm}
6913	6	272.0±70.4^{b}
6914	8	239.0±42.4^{bcdef}
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±33.3^{p}
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±14.5^{a}
6925	469	076.0±44.4^{bcdef}
6926	269	082.0±64.4^{bc}
6928	521	077.0±50.4^{bcde}
6929	310	080.0±94.3^{ijklmn}
6930	440	074.0±03.4^{hijklm}
6931	175	085.0±96.3^{ijklm}
6932	261	082.0±65.3^{no}
6934	49	117.0±12.4^{ghijkl}
6935	125	092.0±91.3^{klmn}
6936	76	104.0±34.3^{p}
6937	73	105.0±25.4^{efghi}
Total	7291	072.0±26.3

The levels which have common letters was not significant

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

Factor	N	μ±SE*
Sex		
Male	3073	414.0±54.22^{a}
Female	3714	414.0±52.21^{b}
Birth type		
Single	5627	277.0±94.21^{a}
Twin	1143	292.0±90.20^{ab}
Triplet	17	943.0±12.20^{b}
Weighting month		
1	717	364.0±00.22^{b}
2	4165	324.0±51.21^{b}
3	1485	332.0±13.22^{b}
4	39	851.0±47.24^{a}
5	16	982.0±58.24^{a}
6	32	988.0±74.21^{b}
11	160	610.0±40.22^{b}
12	173	506.0±08.22^{b}
Weighting year		
1994	152	882.0±91.19^{g}
1995	200	833.0±43.24^{a}
1996	498	421.0±27.21^{e}
1997	1267	398.0±26.19^{h}
1998	581	414.0±66.20^{f}
1999	497	423.0±96.20^{ef}
2000	662	415.0±35.22^{d}
2001	271	443.0±43.23^{b}
2002	705	403.0±51.23^{b}
2003	744	409.0±24.23^{bc}
2004	546	397.0±80.22^{cd}
2005	664	408.0±40.22^{d}
Flock		
6901	-	-
6903	62	643.0±88.23^{bc}
6904	112	556.0±99.17^{m}
6905	196	532.0±96.21^{efghi}
6906	330	475.0±71.20^{ij}
6909	628	456.0±71.20^{ij}
6910	62	644.0±87.15^{n}
6911	79	738.0±31.18^{lm}
6912	354	471.0±79.22^{cdefg}
6913	39	736.0±34.19^{kl}
6914	58	655.0±37.18^{lm}
6915	91	608.0±16.15^{n}
6916	142	536.0±86.18^{lm}
6917	364	471.0±96.21^{efghi}
6918	249	490.0±14.19^{klm}
6919	486	444.0±08.23^{cdefg}
6921	-	-
6921	566	446.0±57.22^{cdefgh}
6923	413	463.0±16.22^{efgh}
6924	375	529.0±32.23^{cde}
6925	517	460.0±17.23^{cdef}
6926	477	469.0±86.21^{fghi}
6928	333	482.0±94.22^{cdefg}
6929	274	492.0±35.21^{hij}
6930	155	511.0±35.21^{hij}
6931	16	027.0±72.21^{ghi}
6932	161	528.0±35.21^{hij}
6934	23	900.0±01.25^{ab}
6935	62	653.0±48.22^{defgh}
6936	36	783.0±85.22^{cdefg}
6937	48	707.0±71.25^{a}
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 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		
Male	1807	633.0±49.33[a]
Female	2254	636.0±38.30[b]
Birth type		
Single	3361	348.0±91.32[a]
Twin	689	391.0±09.31[ab]
Triplet	11	607.1±04.30[b]
Weighting month		
1	51	164.1±54.31[bc]
2	68	198.1±19.34[a]
3	118	831.0±26.34[a]
4	1024	606.0±06.33[ab]
5	2449	582.0±48.32[bc]
6	319	708.0±14.31[c]
7	32	161.1±68.32[abc]
Weighting year		
1995	44	486.1±95.32[ab]
1996	234	003.1±86.33[a]
1997	998	647.0±83.31[bc]
1998	452	694.0±02.34[a]
1999	61	964.0±90.33[a]
2000	262	723.0±62.31[c]
2001	209	722.0±50.32[bc]
2002	544	670.0±97.32[ab]
2003	330	707.0±74.31[c]
2004	458	663.0±76.33[a]
2005	469	658.0±61.31[c]
Flock		
6901	125	834.0±80.31[ghijk]
6903	10	769.1±64.40[a]
6904	39	076.1±69.24[m]
6905	194	780.0±06.37[bcd]
6906	89	846.0±64.28[l]
6908	2	709.3±23.37[bc]
6909	472	672.0±68.30[jkl]
6910	41	046.1±62.28[l]
6911	86	115.1±49.35[bcde]
6912	280	712.0±28.34[cdefgh]
6913	40	053.1±29.32[fghijk]
6914	41	047.1±00.31[ijkl]
6916	50	988.0±29.28[l]
6917	175	741.0±52.34[bcdefg]
6918	97	818.0±04.30[kl]
6919	541	661.0±03.35[bcdef]
6920	32	141.1±98.30[ijkl]
6921	366	678.0±84.30[jkl]
6923	224	731.0±97.32[efghijk]
6924	144	041.1±68.33[efghij]
6925	217	725.0±55.28[l]
6926	129	803.0±17.35[bcdef]
6928	89	869.0±51.37[b]
6929	204	752.0±31.31[hijkl]
6930	72	869.0±04.34[defghi]
6931	24	248.1±78.34[bcdefg]
6932	67	912.0±49.32[efghijk]
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±61.32[efghijk]
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[a]
Sex		
Male	2206	07.5±38.190[a]
Female	2440	07.5±69.177[b]
Weighting year		
1994	291	56.7±75.201[b]
1995	481	39.5±09.176[c]
1996	428	81.5±67.161[d]
1999	60	36.8±13.180[c]
2000	198	32.6±98.216[a]
2001	755	32.5±32.212[a]
2002	915	23.5±78.208[ab]
2003	636	35.5±45.217[a]
2004	882	30.5±69.212[a]
Birth type		
Single	3764	47.3±61.205[a]
Twin	862	81.3±61.192[ab]
Triplet	20	44.11±03.18b[a]
Weighting month		
1	48	50.9±50.218[b]
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]
12	290	06.5±70.243[a]
Flock		
6901	13	59.14±15.203[defghi]
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[defghi]
6913	6	51.20±50.181[ghijk]
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[a]
6921	224	95.5±75.244[ab]
6923	326	62.5±56.189[efghij]
6924	408	93.5±11.209[def]
6925	250	89.5±63.207[defg]
6926	167	42.6±28.212[cde]
6928	349	85.5±45.191[efghij]
6929	284	88.5±66.177[ijk]
6930	248	76.5±51.236[abc]
6931	17	83.12±96.182[fghijk]
6932	173	31.6±16.210[de]
6934	38	53.9±93.246[a]
6935	78	61.7±51.211[cde]
6936	48	78.8±75.220[bcd]
6937	67	01.8±25.235[abc]
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

Factor	N	μ±SE[a]
Sex		
Male	3561	072.0±37.3[a]
Female	3730	072.0±14.3[b]
Birth year		
1994	439	073.0±78.4[a]
1995	903	060.0±48.4[ab]
1996	654	064.0±07.4[bcde]
1997	3	375.0±33.4[abcd]
1999	75	097.0±40.4[abc]
2000	285	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[e]
2004	1477	060.0±00.4[cde]
2005	4	330.0±00.4[cde]
Birth type		
Single	5867	151.0±2.4[a]
Twin	1403	057.0±52.3[b]
Triplet	21	054.0±72.2[c]
Birth month		
1	214	081.0±22.4[bc]
2	92	098.0±03.4[cd]
3	20	163.0±64.3[e]
6	25	147.0±11.4[cd]
7	273	81.0±75.4[a]
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±39.4[cdefg]
6910	6	272.0±57.4[bcd]
6911	378	082.0±22.4[efghij]
6912	338	078.0±05.4[hijklm]
6913	6	272.0±70.4[b]
6914	8	239.0±42.4[bcdef]
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±33.3[p]
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±14.5[a]
6925	469	076.0±44.4[bcdef]
6926	269	082.0±64.4[bc]
6928	521	077.0±50.4[bcde]
6929	310	080.0±94.3[jklmn]
6930	440	074.0±03.4[hijklm]
6931	175	085.0±96.3[ijklm]
6932	261	082.0±65.3[no]
6934	49	117.0±12.4[ghijkl]
6935	125	092.0±91.3[klmn]
6936	76	104.0±34.3[p]
6937	73	105.0±25.4[efghi]
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.

ACKNOWLEDGEMENTS

Special thanks to Jahad-e-Keshavarzi organization and personals who delivered information to the researchers.

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