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## **Growth, carcass composition and nutrient content of meat of different local geese in Isparta region of Turkey** (short communication)

### Summary

The local goose breeds Kara, Beyaz, Şam, Ala and Tülü of the Isparta province in Turkey are relatively small with body weight at the age of 12 weeks for males-females of 2864.1-2593.1, 2588.5-2296.8, 3004.3-2504.3, 2601.9-2264.0 and 2754.7-2352.0 g.

The average percentages of slaughter yield of Kara, Beyaz and Şam geese at the age of 104 weeks for males-females were 71.4-69.8, 71.6-69.9 and 71.0-69.3%. The percentages of breast and leg to the carcass were 46.6-48.4, 48.7-50.2 and 47.1-48.3%, respectively.

Average percentages of crude protein content for breast and leg muscle were 19.7-20.1, 22.0-20.3, 18.2-18.0% and 15.8-18.0, 21.7-16.2, 17.7-19.8%, respectively. The content of crude fat for breast and leg muscle were 0.23-0.49, 0.39-0.40, 0.44-0.40% and 0.92-1.41, 0.39-1.31, 0.46-0.33%, respectively. Because of the lower fat percentage, the local goose breeds could be important for a commercial crossbred program.

Key Words: local goose, body weight, carcass, nutrient content.

### Zusammenfassung

Titel der Arbeit: **Wachstum, Schlachtkörperzusammensetzung und Nährstoffgehalt im Brustmuskel einheimischer Gänserassen aus der Provinz Isparta in der Türkei** (Kurzmitteilung)

Die lokalen Gänserassen Kara, Beyaz, Şam, Ala und Tülü in der Provinz Isparta in der Türkei sind relativ klein bei einem 12-Wochengewicht der männlichen und weiblichen Tiere von 2864,1-2593,1, 2588,5-2296,8, 3004,3-2504,3, 2601,9-2264,0 und 2754,7-2352,0 g.

Der Schlachtkörperanteil der Rassen Kara, Beyaz und Şam im Alter von 104 Wochen für Ganter und Gänse beträgt 71,4-69,8, 71,6-69,9 und 71,0-69,3%. Der Anteil von Brust und Keule am Schlachtkörper beträgt für Ganter und Gänse 46,6-48,4, 48,7-50,2 und 47,1-48,3%.

Der Gehalt an Rohprotein im Brustmuskel liegt bei 19,7-20,1, 22,0-20,3, 18,2-18,0% und im Schenkelmuskel bei 15,8-18,0, 21,7-16,2, 17,7-19,8 %. Für den Rohfettgehalt belaufen sich die Werte im Brustmuskel auf 0,23-0,49, 0,39-0,40, 0,44-0,40 % und im Schenkelmuskel auf 0,92-1,41, 0,39-1,31, 0,46-0,33%. Der niedrige Fettgehalt des Muskelfleisches macht diese lokalen Gänserassen interessant für ein kommerzielles Kreuzungsprogramm.

Schlüsselwörter: Gänserassen, Körpergewicht, Schlachtkörper, Nährstoffgehalt

### Introduction

Turkey is surrounded by Sea, and has natural sources of fresh water on which different local goose genotypes have been extensively produced in primitive conditions. The goose production is generally intensified around Kars, Erzurum and Ağrı provinces of East Anatolian region, but, has not been widely spread to Turkey due to damaging of vegetable gardens and agricultural areas (SELÇUK and AKYURT, 1986). The goose breeding has been practised in small farms with white, black and white, grey and black goose varieties (SELÇUK et al., 1983) at extensive conditions. There are no statistical data on goose production potential and no informations on characteristics and performances of local goose breeds (TESTIK, 1995).

In Isparta province the goose breeding have been widespread around Şarkikaraağaç, Senirkent, Eğirdir villages and in Konya province around Beyşehir Lake (İŞGÜZAR and TESTİK, 1999). Some breeds have already been lost and the others were found to be moving rapidly to the brink of extinction. For this reason conservation actions have been started. FAO recognised the urgency of characterising and conserving indigenous breeds in developing countries as soon as possible (HODGES, 1992). There are also increasing demands in many countries for products which are produced by sustainable technics (VARADI, 1995). The first objective in making goose meat more acceptable by the consumers is to increase the proportion of muscle, especially breast and leg muscles. Therefore, we need information on different traits of the native geese in Turkey.

The purpose of this research was to investigate growth, carcass traits and the nutrient content of meat of different local goose breeds, to find out differences among genotypes.

### Material and method

The experiment was conducted with day old goslings of five local goose genotypes (Kara, Beyaz, Şam, Ala, Tülü) in April at natural conditions. Each of the genotype group was consisted of 30-80 goslings, and all groups were identified with wing number without sexing and were weighted by electronic weight tool ( $\pm 2g$ ) at the age of 0, 1, 3, 5, 7, 9 and 12 weeks.

The birds were fed commercial starter ration (22% protein and 3060 kcal/kgME) only for the first two weeks. The birds hadn't have ad libitum. Thereafter they were kept under extensive natural conditions together with the adult geese. At sun rising the geese went out from the home yard to the pastures near lakes and roads, to the harvested fields and to ponds. When they came back home in the evening, wheat, barley, maize or corn mix and remains of melon, water melon and other foods were given in the home yard. From June until November geese have been fed by the remainings of corn mix after harvest.

All goose genotypes were determined by physical appearances and sexes at the age of 12 weeks. Kara, Beyaz and Şam goose genotypes of the local five genotypes were kept in the hen house under intensive conditions for two laying periods. Because they were the most widespread genotypes in the region. After the genotypes finished the 2<sup>nd</sup> laying period, the geese were slaughtered at 104 weeks of age (4 weeks after finishing the 2<sup>nd</sup> laying period) and were cut to determine the part of the carcasses. The carcasses and their parts were weighted without edible organs and with skin. Three birds of each sex and each group were taken to analyse the chemical meat composition. The results of body composition and protein, fat analyses are shown for the races Kara, Beyaz and Şam. Crude protein and fat analyses of muscular meat were made by Kjeldahl and Soxhlet tool, respectively (JAMES, 1995; Anon., 1993). Bio-statistical analyses were done with MINITAB for WINDOWS (version 10.5). Mstatc was used for the test of significance.

### Results and discussion

#### Growth

Table 1 shows the means of the body weights up to the age of twelve weeks. There are significant differences among genotypes and sexes. The average body weights of both

sexes at the age of 9 weeks were 1984.2 and 2572.0 g and at the age of 12 weeks 2264.0 and 3004.3 g. In this way, these values are lower to Rhenish and Italian White goslings (GROM et al., 1980) with 3531 to 3473 g and to 4 lines of Iva geese (KOCI, 1983) with 3.6 to 4.0 kg at 8 weeks and to Italian White and Landes (SALEEV et al., 1982) with 3790 to 4210 g at 9 weeks and 4453 to 5038 g at 13 weeks and to Italian White, Bilgoraj and Lubno goslings (FARUGA and WOLOS, 1983) with 2106, 2046 and 1953 g at 4 weeks and 4108, 4116 and 3740 g at 8 weeks and to Italian White goslings (BIELINSKI et al., 1983) with 4.88 kg at 10 weeks and to Czech. White and Italian White (HROUZ, 1980) with 4070 and 4410 g at 8 weeks.

Table 1

Average body weight of local goose genotypes at different age (g) (Durchschnittliches Körpergewicht lokaler Gänserassen bei unterschiedlichem Alter)

Age Weeks	Sex	Kara	Beyaz	Şam	Ala	Tülü					
		n	N	n	n	n					
0	M	19	93.5±1.5 <sup>a</sup>	25	78.3±2.3 <sup>cd</sup>	12	99.7±1.3 <sup>a</sup>	39	78.5±2.4 <sup>cd</sup>	16	92.5±1.5 <sup>ab</sup>
	F	13	85.9±2.5 <sup>bc</sup>	23	77.5±2.3 <sup>d</sup>	14	85.1±1.9 <sup>bcd</sup>	36	66.5±2.0 <sup>e</sup>	16	80.0±1.3 <sup>cd</sup>
1	M	19	190.1±3.7 <sup>a</sup>	25	150.6±5.9 <sup>de</sup>	12	181.0±2.9 <sup>ab</sup>	39	163.6±5.0 <sup>bcd</sup>	16	170.0±7.2 <sup>bc</sup>
	F	13	163.7±5.3 <sup>cd</sup>	23	149.8±5.5 <sup>de</sup>	14	153.4±6.1 <sup>cd</sup>	36	134.6±3.8 <sup>e</sup>	16	146.6±4.8 <sup>de</sup>
3	M	19	626.8±12.4 <sup>a</sup>	25	493.3±19.5 <sup>bc</sup>	12	633.7±12.0 <sup>a</sup>	39	530.2±14.5 <sup>bc</sup>	16	539.0±19.4 <sup>b</sup>
	F	13	504.8±13.3 <sup>bc</sup>	23	479.3±16.9 <sup>c</sup>	14	544.6±16.9 <sup>b</sup>	36	423.6±10.6 <sup>d</sup>	16	477.5±9.7 <sup>c</sup>
5	M	19	1280.3±22.7 <sup>a</sup>	25	1040.8±30.4 <sup>c</sup>	12	1305.3±22.3 <sup>a</sup>	39	1276.9±20.0 <sup>a</sup>	16	1126.0±37.7 <sup>b</sup>
	F	13	1054.6±29.3 <sup>bc</sup>	23	956.9±26.0 <sup>d</sup>	14	1246.9±10.1 <sup>a</sup>	36	1129.9±17.9 <sup>b</sup>	16	949.7±23.3 <sup>d</sup>
7	M	19	2064.4±20.0 <sup>a</sup>	25	1740.8±37.9 <sup>cd</sup>	12	2048.0±18.3 <sup>a</sup>	39	1929.8±28.1 <sup>b</sup>	16	1841.3±56.8 <sup>bc</sup>
	F	13	1775.7±31.9 <sup>cd</sup>	23	1586.7±35.0 <sup>e</sup>	14	1768.9±42.1 <sup>cd</sup>	36	1724.6±25.2 <sup>d</sup>	16	1590.3±34.5 <sup>e</sup>
9	M	19	2547.9±19.9 <sup>a</sup>	25	2216.6±35.8 <sup>cd</sup>	12	2572.0±22.2 <sup>a</sup>	39	2365.9±24.0 <sup>b</sup>	16	2306.0±58.8 <sup>bc</sup>
	F	13	2308.8±34.3 <sup>bc</sup>	23	1988.7±32.0 <sup>e</sup>	14	2128.9±62.7 <sup>d</sup>	36	1985.9±22.2 <sup>e</sup>	16	1984.2±28.1 <sup>e</sup>
12	M	19	2864.1±26.3 <sup>b</sup>	25	2588.5±28.3 <sup>d</sup>	12	3004.3±40.0 <sup>a</sup>	39	2601.9±16.7 <sup>d</sup>	16	2754.7±49.6 <sup>c</sup>
	F	13	2593.1±24.7 <sup>d</sup>	23	2296.8±19.3 <sup>fg</sup>	14	2504.3±21.7 <sup>e</sup>	36	2264.0±16.3 <sup>g</sup>	16	2352.0±29.2 <sup>f</sup>

n=Observation number, <sup>a,b</sup>=Different letters in the same row show significant difference (P<0.05). M=male, F=female

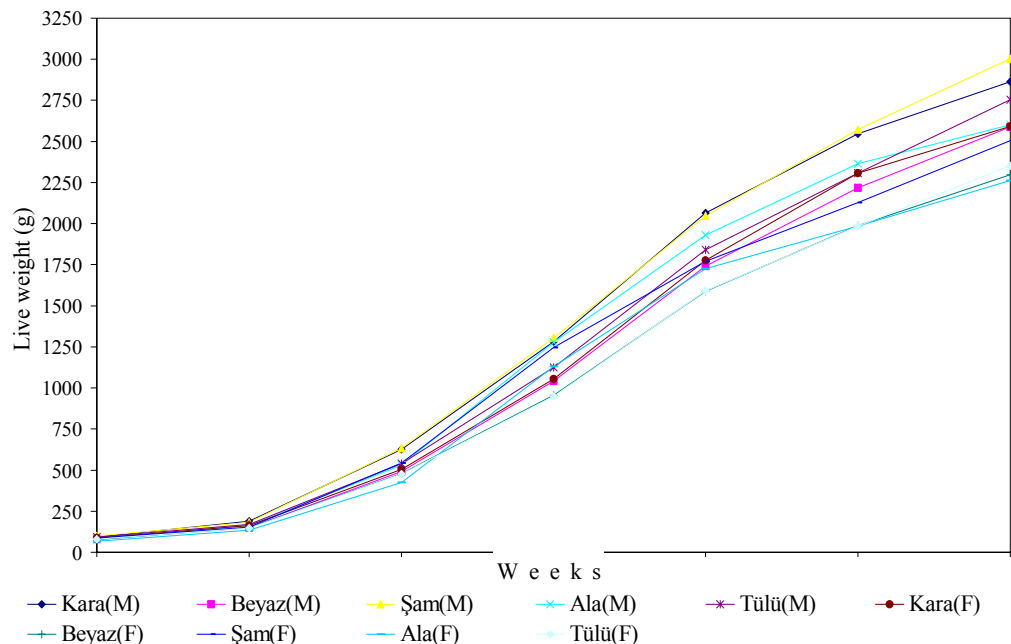


Fig.: Growth curves of local geese as males and females (Wachstumskurven der Gänserassen getrennt nach Geschlechtern)

The growth curves of males and females in the Figure demonstrate the characteristic growth rate for common geese. In the first week of life geese have low but thereafter a

very intensive growth rate until 7 weeks of age. At the age of 12 weeks geese have reached almost 80 % of the adult weight.

In our research, the adult weights of local geese were 3042.0 to 3857.3 g. The values are lower to Turkish breeder geese (SELÇUK et al., 1983) with 4.0 to 6.0 kg and to Kars region's geese (İLASLAN and AŞKIN, 1976) with 4.6 to 5.1 kg and to Rhenish goslings (LAZAR et al., 1980) with 4976 to 5667 g and to White Italian goslings (BIELINSKI et al., 1983) with 5.47 to 5.94 kg and to Xupu geese (MAO et al., 1984) with 5.5 to 6.5 kg.

### Carcass traits

At the age of 104 weeks the geese have been slaughtered and cut. The means of the carcass characteristics are shown in Table 2.

Table 2

Composition of the body of local goose genotypes at the age of 104 weeks (%) (Schlachtkörperzusammensetzung der unterschiedlichen Gänserassen im Alter von 104 Wochen)

Body Parts	Sex	Kara		Beyaz		Şam	
		n		n		n	
Carcass / body	M	6	71.44 ± 0.45 <sup>a</sup>	6	71.60 ± 1.33 <sup>a</sup>	6	70.97 ± 0.89 <sup>a</sup>
	F	6	69.82 ± 0.76 <sup>a</sup>	6	69.87 ± 1.12 <sup>a</sup>	6	69.34 ± 0.78 <sup>a</sup>
Breast / carcass	M	6	22.82 ± 0.77 <sup>ab</sup>	6	21.40 ± 0.39 <sup>b</sup>	6	21.95 ± 0.52 <sup>ab</sup>
	F	6	24.52 ± 1.67 <sup>a</sup>	6	22.34 ± 0.32 <sup>ab</sup>	6	22.20 ± 0.77 <sup>ab</sup>
Legs / carcass	M	6	23.77 ± 0.18 <sup>c</sup>	6	24.64 ± 0.15 <sup>bc</sup>	6	25.05 ± 0.32 <sup>bc</sup>
	F	6	23.94 ± 0.51 <sup>c</sup>	6	27.89 ± 1.20 <sup>a</sup>	6	26.06 ± 0.75 <sup>ab</sup>
Neck / carcass	M	6	8.51 ± 0.16 <sup>b</sup>	6	9.80 ± 0.23 <sup>a</sup>	6	8.55 ± 0.06 <sup>b</sup>
	F	6	7.66 ± 0.32 <sup>c</sup>	6	8.43 ± 0.38 <sup>b</sup>	6	8.50 ± 0.27 <sup>b</sup>
Wing / carcass	M	6	17.15 ± 0.14 <sup>a</sup>	6	16.78 ± 0.35 <sup>ab</sup>	6	16.94 ± 0.34 <sup>ab</sup>
	F	6	15.87 ± 0.48 <sup>b</sup>	6	16.02 ± 0.15 <sup>ab</sup>	6	17.05 ± 0.51 <sup>a</sup>
Back / carcass	M	6	27.75 ± 0.60 <sup>a</sup>	6	27.38 ± 0.66 <sup>a</sup>	6	27.51 ± 0.54 <sup>a</sup>
	F	6	28.01 ± 0.80 <sup>a</sup>	6	25.32 ± 1.46 <sup>a</sup>	6	26.20 ± 1.26 <sup>a</sup>
Heart / carcass	M	6	1.08 ± 0.06 <sup>a</sup>	6	0.94 ± 0.05 <sup>ab</sup>	6	1.03 ± 0.08 <sup>a</sup>
	F	6	0.81 ± 0.03 <sup>b</sup>	6	0.83 ± 0.03 <sup>b</sup>	6	0.82 ± 0.01 <sup>b</sup>
Liver / carcass	M	6	2.09 ± 0.09 <sup>b</sup>	6	2.06 ± 0.06 <sup>b</sup>	6	2.28 ± 0.23 <sup>b</sup>
	F	6	2.21 ± 0.16 <sup>b</sup>	6	2.14 ± 0.16 <sup>b</sup>	6	2.87 ± 0.13 <sup>a</sup>
Gizzard / carcass	M	6	4.53 ± 0.18 <sup>bc</sup>	6	4.61 ± 0.41 <sup>bc</sup>	6	4.30 ± 0.21 <sup>bc</sup>
	F	6	3.80 ± 0.04 <sup>c</sup>	6	5.67 ± 0.57 <sup>a</sup>	6	4.92 ± 0.17 <sup>ab</sup>
Intenstine / carcass	M	6	8.63 ± 0.19 <sup>b</sup>	6	8.17 ± 0.21 <sup>b</sup>	6	9.01 ± 0.65 <sup>b</sup>
	F	6	13.18 ± 1.40 <sup>a</sup>	6	9.55 ± 0.73 <sup>b</sup>	6	12.95 ± 1.67 <sup>a</sup>
Head / body	M	6	4.56 ± 0.06 <sup>a</sup>	6	4.00 ± 0.09 <sup>bc</sup>	6	4.12 ± 0.04 <sup>b</sup>
	F	6	3.75 ± 0.16 <sup>c</sup>	6	4.04 ± 0.11 <sup>bc</sup>	6	3.93 ± 0.07 <sup>bc</sup>
Feet / body	M	6	3.16 ± 0.12 <sup>a</sup>	6	2.93 ± 0.03 <sup>ab</sup>	6	3.06 ± 0.03 <sup>ab</sup>
	F	6	2.83 ± 0.10 <sup>b</sup>	6	2.95 ± 0.10 <sup>ab</sup>	6	3.08 ± 0.07 <sup>ab</sup>
Blood, feathers and Etc. / body	M	6	9.17 ± 0.44 <sup>a</sup>	6	10.22 ± 1.03 <sup>a</sup>	6	10.13 ± 0.99 <sup>a</sup>
	F	6	9.71 ± 0.14 <sup>a</sup>	6	10.52 ± 0.52 <sup>a</sup>	6	8.76 ± 0.21 <sup>a</sup>

n=Observation number, <sup>a,b</sup>=Different letters in the same row show significant difference (P<0.05). M=male, F=female

In this study, the average body weights of Kara, Beyaz and Şam geese for males-females were 3300.7-3193.0, 3572.3-3125.0, 3857.3-3042.0 g and the average carcass weights were 2358.3-2227.7, 2556.0-2178.7, 2736.3-2111.3 g. Generally, the data of carcass percentage were 69.3 to 71.6 % and similar to GALLO et al. (1983) and HROUZ (1982). Females of Kara and Beyaz geese had the significant highest breast

and leg percentages. Generally, the breast meat percentage was high in all genotypes. The reason is the relatively high age of 104 weeks.

Differences of percentages for carcass, back, heart and liver were not significant between genotypes, but there was a big difference for leg percentage between female Kara and Beyaz geese and for neck between male Beyaz and female Kara geese.

The comparison of our data with literature is not possible, because it is not mentioned if the carcass includes the edible organs or not. The same is for the neck. Furthermore, the data of literature are from young geese.

#### Nutrient content of meat

Means of protein and fat content of breast and leg meat are shown in Table 3. The percentage of protein in meat of geese is 18 to 22%. The highest percentage of crude protein was observed in breast and leg meat of males of Beyaz goose.

Table 3

Protein and fat content of breast and leg muscle of different goose genotypes (%) (Eiweiß- und Fettgehalt von Brust- und Beinmuskelfleisch unterschiedlicher Gänserassen im Alter von 104 Wochen)

Quality traits	Sex	n	Kara	Beyaz	Şam	
Protein	Breast	M	3	19.69±1.25 <sup>abc</sup>	21.96±0.35 <sup>a</sup>	18.22±0.62 <sup>abc</sup>
		F	3	20.13±1.65 <sup>abc</sup>	20.25±0.19 <sup>abc</sup>	17.99±0.88 <sup>abc</sup>
	Legs	M	3	15.79±1.10 <sup>d</sup>	21.71±0.05 <sup>ab</sup>	17.71±0.85 <sup>bcd</sup>
		F	3	18.04±2.37 <sup>abc</sup>	16.18±1.57 <sup>cd</sup>	19.84±1.42 <sup>abc</sup>
Fat	Breast	M	3	0.23±0.01 <sup>b</sup>	0.39±0.04 <sup>ab</sup>	0.44±0.18 <sup>ab</sup>
		F	3	0.49±0.38 <sup>ab</sup>	0.40±0.12 <sup>ab</sup>	0.40±0.10 <sup>ab</sup>
	Legs	M	3	0.92±0.34 <sup>ab</sup>	0.39±0.06 <sup>ab</sup>	0.46±0.17 <sup>ab</sup>
		F	3	1.41±0.34 <sup>a</sup>	1.31±0.91 <sup>ab</sup>	0.33±0.08 <sup>ab</sup>

n=Observation number, <sup>a,b</sup>=Different letters in the same row show significant difference (P<0.05). M=male, F=female

The values were similar to (HROUZ, 1977) with 21.3 to 21.4 % and to (BIELIŃSKI et al., 1983) with 20.8, 22, 22.7 and 20.9 %.

The percentage of fat in legs were higher than in breast. The females of Kara goose had the highest fat content with 1.4 % among genotypes. These values were lower than (HROUZ, 1977) with 2.6 to 3.0 % and (KOCIOVA et al., 1980) with 3.7 to 4.8 % in the breast muscle and 4.0 to 11.1 % in leg muscles, respectively. The local goose genotypes are suitable for meat production with lower fat content. They are more advantageous with their less fattened meat and should be used within commercial crossbred programs.

#### References

ANONYM:

Analyzis methods of food stuffs. The Ministry of Agriculture and Forest press, Ankara, Turkey, 1993

BIELIŃSKI, K.; BIELIŃSKA, K.; SKARZYŃSKI, L.; TRACZYKIEWICZ, K.:

Effect of age on productivity, carcass value and quality of meat and fat in geese fattened on oats. Rec.200 of 646-CAB Abst.1984-1986. Roczniki Naukowe Zootechniki, **10**: 1, 21-35; 12 ref., 1983

FARUGA, A.; WOLOS, A.:

Possibilities in defining the breeds and strains of geese based on some biochemical indices. Vedecke Prace Hydinarstvo, No.20, 1983, 113-123

GALLO, C.; VEGA, J DE LA.; CAMPOS, M.; BIFANI, V.; SILVA, J.:

- Carcass yield and characters and proportions of meat, skin and bone in Criollo x White Italian geese (*Anser domesticus*) and Muscovy ducks (*Cairina moschata*). Rec.119 of 646-CAB Abst. 1982-1983. *Ciencia e Investigacion Agraria*. 1983, **10**: 1, 43-51; 21 ref.,1983
- GROM, A.; KOCI, S.; MAJNA, R.:  
Genotype nutrition interaction during finishing of broiler geese. *Vedecke Prace Hydinarstvo*, No. 17, 1980, 5-13
- HODGES, J.:  
The threat to in the geneous breeds in developing countries and options for action. *Genetic Conservation of Domestic Livestock*. Vol.2: 47-55. C.A.B. International, 1992
- HROUZ, J.:  
Chemical composition of breast and thigh meat from culled breeding geese. *Acta-Universitatis Agriculturae Brno, Facultas Agronomica*, **25** (1977) 3, 165-171
- HROUZ, J.:  
Carcass quality of geese of different types. *Zivocisna-Vyroba*, **25** (1980) 8, 597-603
- HROUZ, J.:  
An evaluation of Czech White geese. Rec.189 of 646-CAB Abst.1984-1986. *Chovatel*, **21** (1982) 4, 84-85
- ILASLAN, M.; AŞKIN, Y.:  
Investigations on the some economical characteristics of Kars region's geese in Turkey. University of Ankara, The annual of Agriculture faculty, 26, 3, Ankara, Turkey, 1976
- ISGUZAR, E.; TESTIK, A.:  
An investigation on local genotypes of waterfowl in Isparta province of Turkey. 12<sup>th</sup> European Symposium on Waterfowl. 18-20 October, University of Çukurova, Agriculture Faculty in Adana. Proceeding, 1999, 51-56
- JAMES, C.S.:  
Analytical chemistry of foods. Chapman & Hall, First Edition, 1995
- KOCI, E.:  
Production of broiler geese and foie gras in Czechoslovakia. Rec.199 of 646-CAB Abst.1984-1986. *Avicultura*, 52: 12, 31-37; 10 ref., 1983
- KOCIOVA, C.V.; HORVATHOVA, V.; MISIKOVA, E.:  
The content and composition of lipids in geese of different breeds and crosses. Rec.93of 646,CAB Abs.1982-1983. *Vedecke Prace Hydinarstvo*, 18, 61-71;12 ref., 1980
- LAZAR, V.; SPACEK, F.; KRIZ, L.:  
Light regime for growing geese. 1.Growth and development of goslings. *Vedecke Prace Hydinarstvo*, 18, 5-16; 10 ref., 1980
- MAO, Z.S.; GONG, M.X.; QU, W.S.; ZHANG, Z.X.:  
The Xupu goose of China. Rec.212 of 646-CAB Abstracts 1984-1986. *Animal Husbandry and Veterinary Medicine, China*, **16** (1984) 2, 60-62
- SALEEV, P.; LYSENKO, M.; IL'INA, Z.:  
Meat quality in geese. Rec.111 of 646-CAB Abs.982-1983. *Ptitsevodstvo*, 7, 1982, 32-33
- SELCUK, E.; AKYURT, I.; GELIYI, C.:  
Goose husbandry. Ministry of Agriculture and Forest press, Ankara, Turkey, 1983
- SELCUK, E.; AKYURT, I.:  
Duck husbandry. Ministry of Agriculture and Forest press, N: 8, Ankara, Turkey, 1986
- TESTIK, A.:  
The situation of ducks and geese production in Turkey. Proceeding of 10<sup>th</sup> European Symposium on waterfowl, 1995, 43-45
- VARADI, L.:  
Ecological aspect in integrated duck and fish production. Proceeding of 10<sup>th</sup> European Symposium on waterfowl, 1995, 8-19

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