



www.turkjans.com

Meat Characteristics, Fatty Liver Weight and Blood Biochemical Parameters in Force-Feeding Geese

Vasko Gerzilov*, Petar Petrov

Department of Animal Science, Faculty of Agronomy, Agricultural University, Plovdiv, Bulgaria

*Corresponding author: v_gerzilov@abv.bg

Abstract

A study on growth performance, meat characteristics, fatty liver weight and serum biochemical parameters (ASAT, ALAT, alkaline phosphatase, γ -glutamyltransferase, total cholesterol, triglycerides and creatinine) in Landes geese before and after force-feeding was carried out. The overfeeding of geese with corn was taken after 90-days of age. Frequency of daily force feeding was gradually increased from 2 to 5 until the 15th day of force feeding. During force-feeding period, the body weight increased with 57,02 % (from 4507 \pm 135 g to 7077 \pm 102 g). The liver weight increased from 93 \pm 4 g to 568 \pm 44 g (6,11 times), and breast muscle with skin from 557 \pm 24 to 848 \pm 29 (1,52 times). In the end of cramming period it was established significantly increased the serum concentration of ALAT, ASAT, triglycerides and total cholesterol (P<0,001).

Keywords: Geese, force-feeding, meat characteristic, fatty liver (foie-gras), blood biochemical parameters

Introduction

Force-feeding of geese is very old tradition, originating from Ancient Egypt and Mesopotamia, where there is early evidence in paintings found in Mereruka's tomb and in the valley of the Tigris and Euphrates rivers dated at 2500 BC.

The Greeks and the Romans perpetuated the tradition and later expanded during the Middle Ages by Jewish populations in Europe (Guemene and Guy, 2004). Unlike in mammals, lipogenesis in birds is very limited in the adipose tissue and the production of lipids is greater in the hepatic tissue (Alvarenga et al., 2011). According to Hermier (1997) fatty liver occurs in birds when the increase in lipogenesis exceeds the capacity for synthesis and secretion of lipoproteins.

Moreover, foie gras is famous with a delicate texture and delicious flavor and many farmers take advantage of this natural susceptibility to steatosis for the production of fatty liver (Xu et al., 2010). This food product traditionally produced using geese, but over the past few decades they are up to 10 percent from all crammed waterfowls, others are mule ducks. Currently, Bulgaria is the second largest producer after France of this product (Eurofoiegras, 2014). The aim of our study is to research the effect of overfeeding on the meat characteristics, hepatic lipogenesis and blood biochemical parameters in Landes geese.

Materials and Methods

The study was carried out at goose farm for producing fatty liver of region of Bratya Daskalovi in the period May– August 2013. The growing goslings (from 0 to 90 days of age) were housed in free range management system with yards for walk. All birds (n=500) were fed ad libitum with diets consist ME – 11,5 MJ/kg and CP – 18,50 % during the starter period (0-28-days of age) and ME – 11,30 MJ/kg and CP – 15,50 % during the finisher period (29–90-days of age). The overfeeding with corn continued 15 days. Frequency of daily force feeding was gradually increased from 2 times in the start to 5 times in the end of force feeding. Slaughter analysis was measured of 3 birds before and 11 birds after force-feeding.

The serum biochemical analysis was taken before and after force-feeding from the same birds. The blood was allowed to clot for two hours at room temperature (20°C) and the samples were centrifuged at 2000 g for 10 min.

Blood serum alanine aminotransferase (ALAT), aspartate aminotransferase (ASAT), γ -glutamyl transferase (γ -GT), alkaline phosphatase (APh), total cholesterol (Chol), triglycerides (TG), and creatinine (Creat) were determined with an automated biochemical analyzer BS-120 Mindray at an accredited biochemical lab "Provet" – Plovdiv.

Results and Discussion

At the force-feeding period, the overfed geese increase body weight with 57,02 % (from 4507±135 g to 7077±102 g) – P<0,001. The liver weight increases from 93±4 g to 568±44 g i.e. 6,11 times and regarding body weight it increases from 2,06% to 8,03% at the end of over feeding period (table 1). There are a significant increase of the breast muscle, drumettes, and thighs and drumsticks (P<0,001), as well as carcass weight after force feeding (P<0,001). Carcass yield versus body weight decreases in percent (P<0,05). It is because of increasing the weight of internal organs, especially these from digestive system

including liver and the presence of residual amount of the maize in the tract, because the liver increases significantly.

The serum concentrations of aspartate aminotransferase (ASAT), alanine aminotransferase (ALAT), triglycerides (TG) and total cholesterol (Chol) are significantly more after cramming (p<0,001) – table 2. Zhu et al. (2010) in experiment with overfeeding of Landes geese and later Gerzilov et al. (2013) with mule ducks established similar changes of these parameters. According to Hermier (1997) liver steatosis leads to a dramatic increase in plasma cholesterol (especially HDL) and triglyceride concentrations.

Table 1. Body weight and slaughter analysis of geese before and after force-feeding

Indices		Before cramming <i>m±SEM</i>	After cramming <i>m±SEM</i>
Body weight	g	4507±135 a	7077±102 a
Carcass	g	2579±97 a	3718±66 a
	%	57,24±1,61 c	52,55±0,63 c
Liver	g	93±4 a	568±44 a
Liver vs. Carcass	%	3,60±0,21 a	15,41±1,34 a
Breast muscle with skin (magret)	g	557±24 a	848±29 a
Breast muscle with skin vs. Carcass	%	21,60±0,73	22,76±0,43
Thighs and drumsticks	g	643±31 a	997,82±26,72 a
Thighs and drumsticks vs. Carcass	%	24,93±0,76	26,86±0,66
Bone fillet	g	50,33±4,32	51,18±2,08
Wingettes	g	154±8,69	161,27±3,63
Drumettes	g	286±15,66 a	395,64±10,36 a
Neck	g	136,33±9,23 c	161,09±4,17 c
Heart	g	27±2,12 b	36,09±0,88 b
Gizzard	g	66,67±1,78 b	82,91±3,46 b

Note: The difference is significant in the same row at: P<0,05 – c; P<0,01 – b; P<0,001– a

Table 2. Blood serum biochemical parameters

Parameter	Before cramming <i>m±SEM</i>	After cramming <i>m±SEM</i>
ASAT, U/L	43,30±6,97 a	217,25±7,35 a
ALAT, U/L	34,53±2,33 a	86,95±2,35 a
APh, U/L	487,33±89,29	255,33±75,57
γ-GT, U/L	3,90±0,14	6,47±2,24
TG, mmol/L	2,05±0,46 a	6,24±1,84 a
Cholesterol, mmol/L	2,79±0,25 a	6,62±0,57 a
Creatinine, µg/L	16,67±0,50	12,53±2,05

Note: The difference is significant in the same row at: P<0,001– a

Conclusions

Overfeeding in Landes geese induced a huge capability for hepatic steatosis – increase of liver weight with 6,11 times as well as improvement of meat characteristics - significantly increase of breast muscle with skin, thighs and drumsticks and as whole of the carcass yield. It was found a significantly increasing aspartate aminotransferase, alanine aminotransferase, triglycerides and total cholesterol - $p < 0,001$.

References

- Alvarenga, R.R., Zangeronimo, M.G., Pereira, L.J., Rodrigues, P.B., Gomide, E.M., 2011. Lipoprotein metabolism in poultry. *World's Poultry Science Journal* 67:431-440.
- Gerzilov, V., P. B. Petrov, A. Bochukov, 2013. Effect of force-feeding on fatty liver and serum biochemical parameters in mule ducks. *Agrolife Scientific Journal* 2(1):193-196
- Guemene D., and Guy G., 2004. The past, present and future of force-feeding and "foie gras" production. *World's Poultry Science Journal* 60, 210-222.
- Hermier, D. 1997. Lipoprotein metabolism and fattening in poultry. *Journal Nutrition* 127:805S-808S.
- Xu, H., Wang, Y., Han, C., Jiang, L., Zhuo, W., Ye, J., Wang, J., 2010. Estimation of Lipoprotein-lipase Activity (LPL) and Other Biochemical Changes in Two Breeds of Overfeeding Geese. *Asian-Aust. Journal Animal Science* 239(9):1221 – 1228.
- Zhu, L., Wu, Y., Guan, J., Duan, X., Meng, H., Gong, D., 2010. Effect of overfeeding on serum parameters, nutrient component and histology of liver in Landes goose. *China Poultry* 2010-03.
- <http://www.eurofoiegras.com/>