

Characteristics of Improvement in the Turkey Production in the Last 30 Years

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SUMMARY

Examining the background of the exceptional genetic improvement attained in turkeys during the last three decades the main aim of the present research was to assess the contribution of genetic merit (genetic factor) and that of the feeding management (environmental factor) to the realised improvement. BUT Big 6 turkeys and their currently used commercial diet, traditional Bronze type turkeys and their reconstructed diet used in the 1960s were set to a three factorial (G = genotype, I = sex, T = type of diet) trial, carried out in climatized and windowless houses and lasted till 20 weeks of age. Based on the results it could be concluded that the influence of feeding on the turkeys' performance was variable with the changing age nevertheless it was substantially less (7-13%) than that of the genotype. The performance of the modern hybrid using the current diet was 3.1-3.2 times more compared it to that of the Bronze type turkeys' however, applying the diet used in the 1960s the advantage over the to the Bronze type turkeys' performance was decreased to 3.0-3.1 times. Test slaughters in turkey showed radical anatomical changes. The 13-18% improvement in dressing percentage resulted in a highly favourable 10% breast fillets (due to the ratio changes of different body regions) increase on the other hand the 55-65% relative heart ratio is critical from the aspect of an unstable circulatory system.

KEY WORDS

turkey, genetics, nutrition, Bronze type turkey, performance improvement

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INTRODUCTION

Turkey can be regarded as a model species demonstrating the full exploitation of the possibilities offered through science in modern animal breeding. There is no other species in this field – but perhaps salmon – where selection could achieve such a drastic response as in turkey totally changing the sector operation features (Horn and Sütő, 2000). This perhaps not quite adequately treated fact can be verified with the results of turkey experiments conducted in Hungary between 1973-2001 where performance of heavy type turkeys improved in 16 weeks old females 82% meanwhile 20 weeks fattening of male animals resulted 81% increase of live body weight compared the present performance to that of the males used in 1973. The presented results are in good agreement with the results of BUT attained during the last 30 years (Nixey, 1996, 2002). With the improving genetic potential the World's meat production has simultaneously been increased. The main aim of our research was to assess the contribution of genetic and feeding management factors to the realised improvement during the last 30 years. The accomplishment our objectives would also indicate that to what extent could the radical anatomical changes generated by intense selection be accounted for the various health problems of those birds reared in intensive systems.

MATERIALS AND METHODS

Genotypes and method of rearing

The experiments were carried out simultaneously using two different genotypes (a^{1-2}). The first genotype was the modern BUT Big 6 hybrid capable of high growing intensity the second genotype was the Bronze type turkey considered to be aboriginal. Birds of the latter genotype kept using the original rearing conditions do not show the side effects of the intensive selection targeting growing intensity of early ages. After hatching and sexing (b^{1-2} , males and females) the experimental group consisted of 350 Bronze type, 1300 BUT Big 6, altogether 1650 hatchlings. The experimental group was kept from the first day at the test farm of the Faculty of Animal Science in closed climatized houses using deep bedding and providing the same conditions for both genotypes in every aspect. Technical parameters of the experiment's first period can be detailed as follows:

- Number of treatments (v):
 $2/a^{1-2} \times 2/b^{1-2} \times 2/c^{1-2} = 8$
- Number of repetitions (r) within a treatment: 2
- Size of the experimental groups: $8/\text{treatment}/ \times 2/\text{repetitions}/ = 16$ (+14 reserve groups)

- Within the groups 50 male ($5/m^2$) and 60 female hatchlings were placed in a single pen.
- The applied placing density remained unchanged till the age of 42 days when the density of males and females was decreased to 2 birds per m^2 and 4 birds per m^2 respectively. Density modifications were accomplished in order to keep the average weight characterising the groups (genotype, sex, feed management) unchanged.

Diets used

In accordance with the objectives two different feeding managements were applied. The first diet (c^1) was a reconstructed turkey diet used in the 1960s and described in detail by Baintner (1967), the other diet represented a currently used commercial diet ($c^2 = \text{Agrocomplex C. S.}$).

Analysed traits

In the course of the experiment conducted till the age of 20 weeks all traits determining meat production were analysed. Slaughter and dissection of the experimental birds were accomplished applying the standard procedures of Jensen (1983).

Data processing

Rearing and slaughtering data were evaluated as affected by age, sex and feeding management. Experiment was set and carried out using a three factorial block design. ANOVA was applied in order to evaluate data, calculating the least significance between each treatment combination according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

Live weight of the different turkey groups measured at 4, 10, 16 and 20 weeks of age is presented on Table 1.

It could be concluded that the live weight of those groups fed with the diet used in the 1960s though varied with different sex and genotype was significantly less than that of those groups fed with the currently used diet. Measured at the age of 4 weeks (Figure 1.: 100% = performance based on the diet used in the 1960s) the superiority of the currently used diet (caused by the different ingredients and nutrient concentration) resulted an increased live body weight of 41% and 35% in BUT Big 6 turkeys (depending on the sex) but only 19% and 10% in Bronze turkeys. The same performance comparison of the groups measured at the age of 20 weeks showed that the substantial differences in live body weight caused by the different diet during the first period of rearing reasonably decreased in both genotypes and sexes. BUT Big 6 males and

Table 1. Live weight of the examined turkey groups as affected by genotype, sex and nutrition

Genotype and sex	Age (weeks)	Live weight (g)							
		6		10		16		20	
	Type of feed (year)	1967	1999	1967	1999	1967	1999	1967	1999
BUT	Male	702	986	4472	6725	11679	13897	17017	19141
Bronze	Male	426	505	2080	2421	4232	4638	5578	6118
BUT	Female	643	868	3910	5242	8258	10194	11393	12625
Bronze	Female	373	410	1588	1714	2995	3172	3626	3891

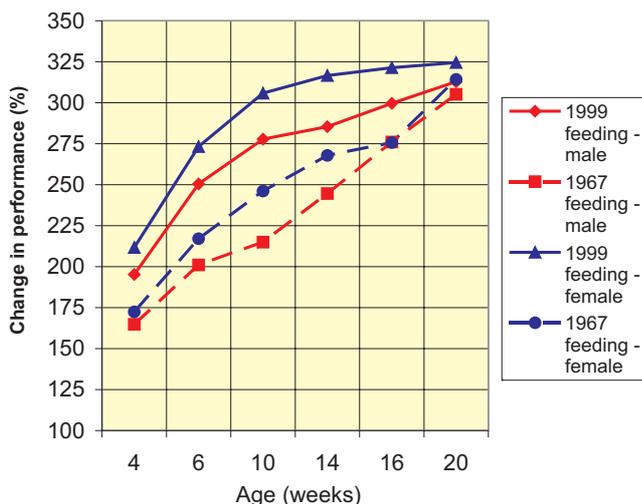


Figure 1.

The relative superiority of the 1999 type (BUT Big 6) turkey in growth compared to the Bronze turkey as affected by feeding and age (Performance of the Bronze type turkey = 100 %)

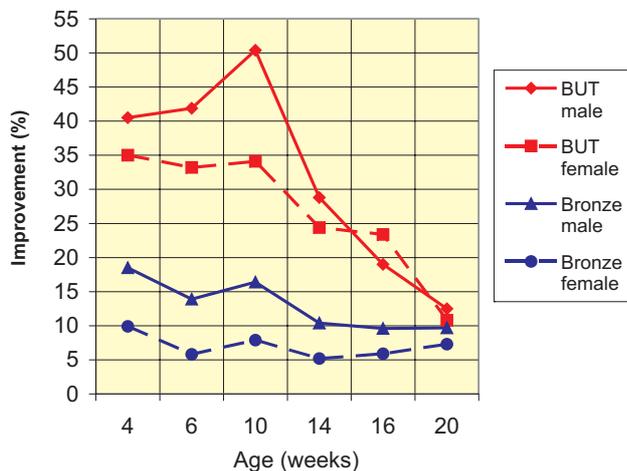


Figure 2.

The relative effect of feeding management (1999 vs. 1967) on live weight of the turkeys as affected by age (1967 type of feeding = 100 %)

females showed 13% (2124 grams) and 11% (1232 grams) superiority, meanwhile the difference in live body weight decreased to 10% (540 grams) and 7% (265 grams) in Bronze turkey males and females respectively.

From the results it can be clearly seen that during the last 30 years diet inventors mainly concentrated on the utilisation of early age growing intensity and by increasing the nutrient concentration of the diet fed during this period they tried to provide sufficient grounds for the expression of genetic merit also anticipating future compensation procedures.

Treating different feeding programs as different environmental factors (Figure 2), at the age of 4 weeks production of BUT Big 6 turkeys exceeded that of the Bronze Turkeys 1.9, 2.1 times in males and females, respectively, but it was only 1.6-1.7 times greater when the reconstructed diet (used in the 1960s) was applied. Viewing the results of the same comparison at the age of 20 weeks it can be seen that applying the currently used diet live body weight of BUT Big 6 was 3.1-3.2 times greater in males and females, respectively, than that of the Bronze type turkey contemporaries, meanwhile this difference decreased to 3.0-3.1 times when the reconstructed diet (used in the 1960s) was fed. The received phenomenon suggests that mainly the genetic factors could be accounted for the performance differences found in turkey breeding.

Slaughter parameters

Test slaughter data of 20 weeks old 10 BUT Big 6 and 10 Bronze type turkeys representing the genotypes in each feeding program showed substantial differences in slaughter value. Killing out percentage of the BUT Big 6 turkeys varied between 76.1-83.4% exceeding the dressing percentage of the Bronze type turkeys (62.9-65.3%) quantifying a 13-18% difference in the oven-ready weight live body weight ratio.

The anatomical changes caused by the intense selection of the last 30 years are apparent from the modifications in the ratio of the various regions of the carcass indicated for instance by the 10% breast fillet increase.

Through the knowledge the factors causing unstable vascular system during the final stage fattening of present day heavy type turkeys it will come to a different light that heart weight of the currently used genotype is only 55-65% than that of the traditional breed.

CONCLUSIONS

Based on the results it could be concluded that the influence of feeding on the turkeys' performance was variable with the changing age nevertheless it was substantially less (7-13%) than that of the genotype.

The performance of the modern hybrid using the current diet was 3.1-3.2 times more compared it to that of the Bronze type turkeys' however, applying the diet used in the 1960s the advantage over the to the Bronze type turkeys' performance was decreased to 3.0-3.1 times.

Test slaughters in turkey showed radical anatomical changes. The 13-18% improvement in dressing percentage resulted in a highly favourable 10% breast fillets (due to the ratio changes of different body regions) increase on the other hand the 55-65% relative heart ratio is critical from the aspect of an unstable circulatory system.

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