Fattening performance, meat yield and economic aspects of meat and layer type hybrids

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In Germany about 40 million male chicks from laying strains are culled annually after hatching. Raising and utilization is discussed as an alternative especially in organic farming. In a fattening experiment male brown layers hybrids (Meisterhybrid) reached only 34% of daily gain and 27% of breast and leg meat production compared with fast growing broilers (Ross PM3). Production costs increased by 71% per kg meat. Fattening male layer hybrids will therefore waste feed resources and increase environmental pollution. In addition the breast confirmation of the carcasses is not acceptable to the German consumer.

Keywords: male layer hybrid; fattening; eviscerated yield; economics

Introduction

Most broiler growers in Germany use fast growing meat-type strains. Only a small premium niche market (1-2%) prefers slower growing broilers from free range or organic farming (Van Harn and Van Middelkoop, 2001). Until now there was no demand for chicken meat from male layer hybrids. Animal welfare organizations are focusing attention on the practice of culling day-old egg-type male chicks and demand alternative use of these "by-products" of the egg industry. Utilization for meat production is discussed as a possible solution, but there is little information about growing performance (Bauer *et al.*, 1996), slaughter yield (Ristic and Damme, 1999) economics (Shaley and Pasternak, 2000) and potential demand for male layer hybrids.

Material and methods

A fattening experiment was carried out with 200 fast growing broilers (100 m + 100 f Ross PM3), 200 slow growing broilers (100 m + 100 f ISA J 457) and 200 brown egg-type males (Meisterhybrid). The chicks were housed in 12 floor pens of 10 m^2 at a density of

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5 birds/m^2 with 4 replicates per hybrid. All birds were fed ad lib. with an organic starter (12.0 MJ/kg ME; 23,3% crude protein; 0,46% methionine; 1,23% lysine) during the first 10 days, followed by a grower diet (12.0 MJ/kg ME; 21,8% crude protein; 0,41% methionine; 0,94% lysine) for 70 days. Carcass traits were examined after 80 days based on a random sample of 15 birds per sex and hybrid.

Data were analysed using the General Linear Models (GLM) procedure of SAS (1995). Significant differences between groups were determined by the Duncan's multiple range test.

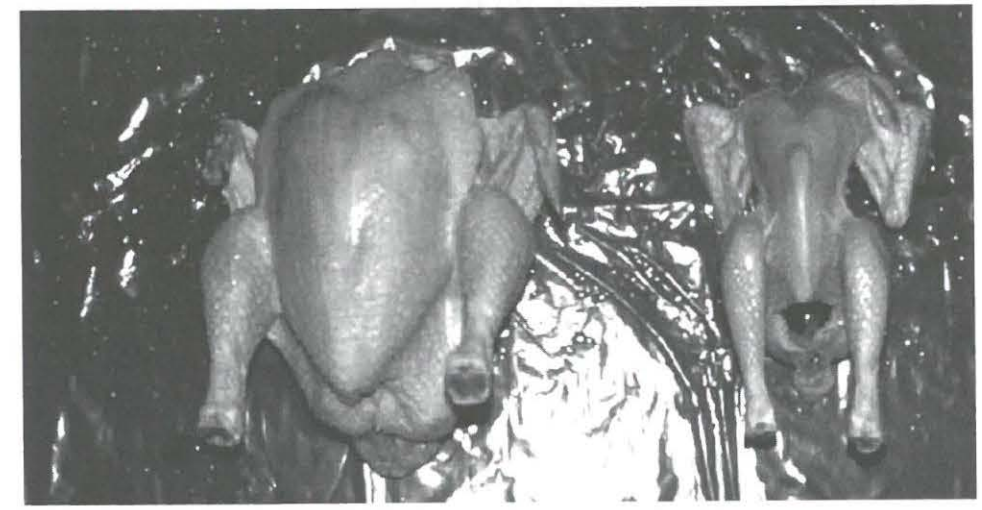
Results and discussion

FATTENING PERFORMANCE AND MEAT YIELD

Fattening performance and carcass traits are shown in *Table 1*. Daily gain observed was 18 g for layer-type cockerels, 32 g for slow growing ISA J 457 and 52 g for fast growing Ross PM3, respectively (average of both sexes in meat-type chickens). Brown layer cockerels consumed 3 kg of organic feed per kg weight gain in the first four weeks of fattening, whereas Ross broilers had a feed to gain ratio of 1.68. With 10 weeks of age the difference between meat-type and layer hybrids in feed conversion ratio (FCR) is reduced, because fat deposition in broilers increases.

In Germany, the target live body weight for broilers is about 1.5 kg. Hence, it seems logical to compare FCR at this weight. FCR to 1.5 kg live weight for the three types was: 1.7 (Ross PM3), 2.0 (ISA J 457) and 3.0 (layer-type). Eviscerated yield in Ross broilers was 9.5% higher than in egg-type cockerels. To 80 days of age, Ross broilers produced approximately 4 times more breast and leg meat (1114 g) than egg-type cockerels (297 g). In addition to these differences in carcass weight, a consumer panel expressed a strong preference for the better breast conformation of meat-type broilers.

Figure 1 Carcass of fast growing broiler (Ross PM3) and brown-egg type male (80 days of age).



ECONOMIC CALCULATIONS

To evaluate the production cost for unsexed fast growing broilers (Ross PM3) *vs.* egg-type cockerels, the following assumptions were made (*Table 2*).

Table 3 shows that the financial input for growing egg-type cockerels is 40% higher than for fattening broilers. Meat production with egg-type males was 71% more expensive than with unsexed broilers.

Conclusions

Long-term selection with main emphasis on meat or egg production in chickens has led to an extreme differentiation of hybrids. Today meat-type chickens grow 3 times faster and produce nearly 4 times more meat than brown-egg type cockerels. For White Leghorn cockerels, the differences would be even larger. If there were a demand for egg-type cockerels, rearing 40 million egg-type males in Germany would require approximately 60.000 t of additional feed and increase environmental pollution accordingly. Apart from economic and environmental considerations, it seems unlikely that a significant number of consumers who express ethical concerns about the killing of day-old males would buy these products if they were offered on the market. Utilization of day-old male layer chicks in pet food and as a high quality animal protein source for predators, cats reptiles, falcons, hawks or zoo animals is unlikely to answer the ethical concerns of animal welfarists, but should be accepted by society until a more satisfactory solution is found.

Acknowledgement

The authors wish to thank Prof. Dr. D.K. Flock for kindly reading the manuscript.

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Table 1 Fattening performance (to 70 days) and carcass yield (at 80 days of age) of meat (average of both sexes) vs. egg-type male hybrids.

Trait	Ross PM 3	ISA J 457	Egg-type
Body weight (g)	3667[a]	2233[b]	1243[c]
Daily gain (g)	52[a]	32[b]	18[c]
Feed consumption (g)	9654[a]	5784[b]	3424[c]
Feed conversion 1 – 28 days of age	1.68[a]	1.81[a]	3.00[b]
(kg feed/kg gain) 1 – 70 days of age	2.66[a]	2.64[a]	2.80[b]
Mortality (%)	6.0	2.0	2.0
Eviscerated yield (% ofof live weight)	73.7[a]	70.2[b]	64.2[c]
Breast yield (% of killed weight)	30.0[a]	27.2[b]	22.4[c]
Leg yield (% of killed weight)	30.0[a]	31.4[a]	34.6[b]
Breast and leg meat, deboned (g)	1114[a]	611[b]	297[c]

[a-c]: means within the same row not sharing a common superscript differ significantly $P<0.05$.

Table 2 Assumptions for economic comparisons.

	meat-type	egg-type
Target live weight (kg)	1,5	1,25
Killing age (days)	30	70
Feed conversion ratio(feed/gain)	1,7	2,8
Birds/m^2	24	20
Batches/year	8.0	4.5
Labour (min./100 birds)	25	60

Table 3 Calculation of meat production cost.

Cost/chicken (cents)	Ross PM3	egg-type
Day-old chick	29	8
Feed (22 €/dt.)	55	74
Vet./energy/water	13	15
Labour (13 €/h)	5	13
Housing	10	21
Total cost/chick	112	131
Cost/kg live weight	75	105
Relative cost/kg live weight (%)	100	140
Cost/kg meat (€)	2.58	4.41
Relative cost/kg meat (%)	**100**	**171**