CARCASS AND MEAT QUALITY OF DUAL-PURPOSE POULTRY TYPES VS. EXTENSIVE BROILER AND LAYER TYPES FATTENED FOR 67 AND 84 D

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Abstract – Using dual-purpose (DP) types is one solution to avoid the culling of male layer cockerels in poultry production. In organic poultry meat production, a longer fattening period with slower growth is aimed at. In the present experiment carcass and meat quality of two DP types, Lohmann Dual and Novogen Dual, were therefore compared with birds from an extensive broiler type and layer hybrid cockerels. The DP types were competitive against the extensive broilers in carcass weight, water-holding capacity and shear force of the meat, with the clear exception of breast meat proportion. The birds from the layer hybrid were clearly inferior in carcass quality to all other groups, whereas meat quality was similar.

Key Words – carcass appearance, meat quality, organic production

I. INTRODUCTION

In the global poultry sector, the production of meat and eggs is extremely specialized. Therefore, specialized hybrids are used for the respective branch of production. In meat production, birds of both genders are fattened. However, as laying performance and meat accretion are antagonistic traits, the productivity of male laying cockerels is low [1; 2], so they are culled immediately after hatch. To avoid this controversially discussed practice, dual-purpose (DP) systems could be established, with females used for egg and males for meat production. However, with these types, a limited performance in both laying and fattening is to be expected [3]. This translates into a longer fattening period to reach an acceptable slaughter weight. Such a measure is prescribed for organic production in Europe anyway, and organic producers therefore currently use slower growing broiler types. The aim of the present experiment was to compare carcass and meat quality of two DP types recently established by major breeding companies with carcass and meat quality obtained with an extensive broiler type and a layer hybrid fattened up to 9.5 and 12 weeks of age.

II. MATERIALS AND METHODS

A total of 5400 chicken of four types were used. The two DP types were Lohmann Dual (LD) and Novogen Dual (ND), the slow growing broiler type was Hubbard S 757 (HU) and the layer hybrid was Lohmann Brown (LB). The birds were kept in an experimental barn, allocated to 4 × 5 compartments (20 m^2 each) with a covered outdoor area (4 m^2) to which the birds had access from day 21 onwards. All birds had *ad libitum* access to an organic fattening diet (12.8 MJ/kg metabolizable energy, 230 g/kg crude protein). On d 67 and d 84, birds from two and three compartments per type, respectively, were slaughtered in an industrial abattoir. On each slaughter event, 24 birds per type were randomly chosen to be slaughtered in a smaller scale unit because of concerns about the feasibility to slaughter the smaller-sized LB on a line scaled for broiler carcasses. The final body weight (BW) of these birds was recorded short before slaughter and the carcasses were stored at 4 °C until being dissected the next day. Carcass, breast meat and legs were weighed, and breast proportion (BP) and leg proportion (LP) were calculated as the ratios of breast meat or leg weight on carcass weight. Breast angle was determined as a measure of keel bone appearance on the carcass, where a smaller angle indicates a more prominent, unappealing, keel bone. The entire right breast muscles of the 24 birds per type and slaughter date were weighed prior to freezing and after thawing and were afterwards cooked to a core temperature of 74 °C in a water bath to determine thawing and cooking loss, respectively. Shear force was subsequently measured with a Volodkevich device [4] mounted on a texture analyzer. Type, age at slaughter and their interaction were tested as fixed effects by analysis of variance (GLM procedure in SAS version 9.4).

III. RESULTS AND DISCUSSION

The average final BW of HU, LD and ND on d 67 and d 84 were 1.7 and 2.4 kg, respectively, with LB being about 40 % lighter at each time point. Similar differences were observed in carcass weights, with HU, LD and ND carcasses

weighing about 1.1 kg at d 67 and 1.5 kg at d 84 and LB 0.6 kg and 0.8 kg, respectively. Still, dressing percentage was numerically lower in LD and ND than HU. It was greater ($P < 0.05$) in HU on d 84 (68 %) than in LB on d 67 (59 %) with all others ranging in between. The breast angle of HU was greatest after 84 d of fattening (126°) than after 67 d (119°) but still greater than the ones of the DP types (between 97 to 105°) and these again greater than the ones from LB with an average of 81°. Visually, the LB birds had the most prominent keel bone, whereas all others appeared quite similar. Breast proportion was greater for HU than LD and ND and did not change with age at slaughter (21, 17 and 18 %, respectively). The BP of LB was only 15 %, which is consistent with the small average breast angle. Overall, leg proportion was greatest in LD (36.4 %) followed by ND and LB (35.7 and 35.0 %) and HU (32.8 %). There were no differences among bird types in thaw losses, which were in the range of 3 to 8 %. These rather moderate thaw losses were below the acceptable threshold of 10 % [5]. The cooking losses, ranging between 7 to 12 %, were greatest for HU, followed by LD and ND and smallest for LB and were greater after 84 d of fattening than after 67 d. Overall, the cooking losses measured were far also below the acceptable threshold of 26% [5]. A possible reason for the differences in cooking losses between types and between age categories could be the different breast muscle dimensions, which are increasing with increasing BP. Larger breast muscle dimensions lead to longer cooking times and, consequently, more loss of moisture [6]. Low shear force is highly correlated with high tenderness [7]. The highest shear force was recorded in HU BP after a fattening period of 84 d (11.8 N). The latter was similar to the shear force of LB (around 11.4 N) regardless of the age at slaughter. By contrast, the lowest shear force was found in HU after 67 d of fattening (9.0 N). The DP types ranged in between with a shear force of around 10 N. Although there were a number of significances, no systematic type trend in meat quality was apparent.

IV. CONCLUSION

The DP types performed at a same level as the extensive broiler type except for breast meat proportion. The latter is disadvantageous when breast meat is sold as a valuable cut, but this is less obvious when selling the entire carcass. At d 84, compared to d 67, valuable cuts were heavier but their proportion of the total carcass remained similar. The layer cockerels were inferior in all important carcass traits. Also concerning meat quality, both DP types could compete with the extensive broilers. Therefore, DP appear suitable for organic systems whereas fattening layer cockerels is unsatisfactory.

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