ABSTRACT

Key words: hen broiler, slow growing, performances, meat quality, profitability

During time, obtaining of bird meat passed successively from extensive traditional rearing, to semi-intensive exploitation type and finally, at intensive-industrial type one.

The aimed goal in this transition was the maximization of meat chickens potential for obtaining of superior productive performances, in a shorter time; phenomenon was based on creation of new gene-types with a high value, on improving of rearing and feeding technologies, but were also made progresses regarding assuring of health state, bio-security and welfare.

In the last period, consumers adopted in the last period a healthy life style, and bird meat is considered a dietetic product, so were recorded increases of the selling for this category of food products.

Also, nowadays society is more and more preoccupied by the rearing, feeding, transport and slaughtering way of animals; such type of concerns include aspects regarding birds' density in farms, type and quality of administrated fodders, mortality rate, apparition of different illnesses (bone system, heart and lungs or the presence of lesions and ecchymoses), but also to some specific elements of slaughtering flow (efficiency of stunning, chilling technique of carcasses etc).

All those factors leaded to reconsideration of activities in aviculture, in the way that were created the so called hybrids with slow growing and elaboration of new rearing technologies for meat chickens, such as "Label Rouge" technology, ecological technology, in different variants of "Certified chicken" with specific demand for obtaining.

From the above mentioned reasons, our research were targeted on evaluation of performances for three meat hen hybrids (Ross-308, Hubbard and HB Color), in conditions of application of a slow growing, in different seasons (warm and respectively, cold), with and without access to external paddock; another variable being represented by the slaughtering age of studied birds (56, 63 and respectively, 81 days).

Investigations were carried out on three series of experiences and aimed the evaluation of technological factors assured to chickens (microclimate and quality of administrated food), their productive performances (corporal weight, growing gain, outflows from flock and fodders' consumption), slaughtering parameters (losses by transport, slaughtering yield, rate of anatomical portions and rate of abdominal fat), quality of obtained meat (sensorial features, physical properties, chemical composition, microbiological features, caloricity, thickness of muscular fibres) and economical indicators of rearing (production costs, processing costs, incomes, benefits).

First series of experiences: "Performances of hen broiler in conditions of slow growing application, with slaughtering at age of 56 days".

From analysis of the assured micro-climate factors from shelters in which chickens were accommodated resulted that those ones were kept at close levels to the ones recommend by rearing guide specific for each hybrid, both in warm season, as well as in cold one; this aspect was valid also for the emissions from shelters, which didn't overturned the recommended levels.

Under the aspect of weights at slaughtering age, the best results were at Ross-308 hybrid (2.25 kg in warm season and 2.50 kg in the cold one), followed by Hubbard (2.20 kg and respectively 2.27 kg in the cold one) and by HB Color (2.05 kg and respectively 2.10 kg).

Regarding the weight gain on the whole studied period (1-56 days), this one was 39.11 g/head/day in warm season and 43.57 g/head/day in the cold one at Ross-308, 38.57 g/head/day-warm season and 39.82 g/head/day-cold season at Hubbard chickens and respectively, 35.89 g/head/day-warm season and 36.79 g/head/day-cold season at HB Color.

Conversely, at hybrid Ross-308 were higher outflows from flock (9.04% in warm season and 10.17% in cold season), just like at HB Color (4.78% and respectively 12.81%), while at hybrid Hubbard was recorded the lowest rate of mortality (2.33% and 7.56%).

Total fodder consumption was in warm season of 4806 g/head at Ross-308 (mean consumption=85.82 g/head/day), 5282 g/head at Hubbard (mean consumption=94.32 g/head/day) and 5802 g/head at HB Color (mean consumption=103.61 g/head/day); in cold season, total consumption was 5015 g/head at Ross-308 (mean=89.55 g/head/day), 5350 g/head at Hubbard (mean=95.55 g/head/day) and 5893 g/head at HB Color (mean=105.23 g/head/day).

Data regarding chickens' transport from farm to slaughtering house, indicated outflows from flock between 0.44% (Ross-308) and 0.81% (HB Color) in warm season and respectively, between 2.0% (Hubbard) and 3.41% (HB Color) in cold season, while for losses of weight, the levels were between 0.74% (Ross-308) and 1.28% (HB Color) in warm season and between 2.07% (Hubbard) and 3.74% (HB Color) in the cold one.

For those two rearing seasons (summer and winter), slaughtering yield was 68.89-70.10% at hybrid Ross-308, face to 66.29-66.52% as it was at Hubbard and only 62.32-62.00% at HB Color. Rate of abdominal fat was situated at levels of 2.35-2.38% for Ross-308 carcasses, 2.15-2.17% at the Hubbard ones and 1.85-1.88% at HB Color; meat losses by thermal treatment were higher also at Ross-308 (34.3-34.8%) and lower at HB Color (32.5-32.9%) and at Hubbard (30.1-30.3%).

Chemically speaking, meat obtained from Hubbard hybrid had the higher content in dry matter (31.78-31.81%), at a quite great distance from HB Color meat (29.93-30.09%) and especially face to the one gathered from Ross-308 (29.17-29.27%).

Proteins were determinate in rates of 20.14-20.36% at meat obtained from Hubbard hybrid, 19.51-19.77% at HB Color and 19.26-19.43% at Ross-308.

Lipids were predominant in meat from HB Color (7.46-7.98%), face to 7.22-7.57% at Hubbard and 6.14-6.30% at Ross-308; from here also the differences regarding meat caloricity (125.81-130.25 kcal/100 g at HB Color; 112.38-119.49 kcal/100 g at Hubbard; 102.07-109.95 kcal/100 g at Ross-308).

Meat of hybrids with slow growing had a lower thickness of muscular fibres (1.88-1.89µ at the one from Hubbard and 1.92-1.93µ at HB Color) in comparison with the one from Ross-308 (2.05-2.10µ), which show a superior finesse.

Calculus of European Efficiency Index shown superior values at hybrid Ross-308 (171-200), face to 159-160 as it was at Hubbard and 117-123 at HB Color.

Conversely, Hubbard hybrid was the only one which closed with profit in both rearing seasons, the other two hybrids recorded negative balance sheets.

Second series of experiences: "Performances of hen broiler in conditions of slow growing application, with slaughtering at age of 63 days".

Rearing and maintenance conditions were assured at close levels to the ones recommended in the guide for each hybrid, speaking about ambient temperatures and as well as airs' relative moisture and emissions' concentration.

Outflows from flock were situated al levels of 11.30-12.06% for Ross-308 hybrid, 8.61-15.99% at HB Color and of only 3.47-8.14% at Hubbard.

At Ross-308 chickens, corporal weight was 2.55 kg in warm season and 2.70 kg in the cold one, at Hubbard 2.60 kg (warm season) and 2.65 kg (cold season), and at HB Color of only 2.28 kg (warm season) and 2.40 kg (cold season).

The above mentioned weight levels were correlated with weight gains of studied chickens which were 39.52-41.90 g/head/day at industrial hybrid Ross-308, 40.63-41.43 g/head/day at Hubbard and of only 35.56-37.46 g/head/day at HB Color hybrid.

Mean consumption of fodders in warm season oscillated between 96.78 g m.f./head/day (Ross-308) and 107.63 g m.f./head/day (HB Color), and the one from cold season between 100.75 g m.f./head/day (Hubbard) and 109.60 g m.f./head/day (HB Color). The results for total consumption of fodders shown that this one was higher in cold season (6359 g at Ross-308; 6347 g at Hubbard; 6905 g at HB Color), than in the cold season (6097 g; 6248 g; 6781 g).

During chickens' transport from farm to slaughter house were recorded weight losses between 0.69% (Hubbard) and 2.07% (Ross-308) in warm season and respectively between 1.70% (Hubbard) and 3.04% (HB Color) in cold seasons. Outflows from flock due to transport were 0.56-1.17% in warm season and 2.03-3.83% in cold one, in both cases higher at HB Color chickens and lower at Hubbard ones.

For slaughtering yield calculated in the case of chickens grown and slaughtered in warm season were founded values of 71.76% at hybrid Ross-308, 68.66% at hybrid Hubbard and 62.50% at hybrid HB Color, and for the ones from cold seasons the values were 71.92%, 68.90% and respectively, 62.69%.

The rate of abdominal fat was higher at industrial chickens, Ross-308 type (2.45-2.48%) and lower at the ones with slow growing (2.22-2.25% at Hubbard and only 1.94-1.99% at HB Color), aspect valid also for losses by thermal treatment (33.8-33.9% at Ross-308, 28.1-28.2% at Hubbard and 28.7-28.9% at HB Color).

Chemically speaking, Hubbard hybrid meat recorded the highest content in dry matter (31.98% in warm season and 32.05% in the cold one), followed by HB Color chickens meat (30.09% and respectively, 30.12%), on the last place being the meat gathered from Ross-308 (29.31% and respectively, 29.56%).

The level of proteins in meat was of only 19.74-19.98% at Ross-308, face to 20.08-20.17% at HB Color and 20.88-21.02% at Hubbard.

Meat caloricity was correlated with fat content (6.63-6.84% at Ross-308 chickens; 7.92-8.16% at Hubbard; 8.44-9.08% at HB Color), being of only 114.44-123.85 kcal/100 g at Ross-308, face to 128.76-132.21 kcal/100 g as it was at Hubbard and especially of 130.14-149.55 kcal/100 g as it was determined at the meat of HB Color chickens.

Also for the finesse of muscular fibres were recorded better values at chickens with slow growing (2.02-2.04 μ at Hubbard and 2.08-2.10 μ at HB Color), in comparison with the one of Ross-308 chickens (2.31-2.34 μ).

European Efficiency Index was better at Hubbard hybrid (162-166 points), face to 147-160 at Ross-308 and 111-112 at HB Color. Financial analysis of rearing and capitalization of those three studied gene-type through the perspective of benefit and losses account revealed that only Hubbard hybrid allowed obtaining of positive economical results, the other two hybrids recording losses at the end of series (impossibility of being sold as cut parts and delivery costs under production costs).

Third series of experiences: "Performances of hen broiler in conditions of slow growing application, with slaughtering at age of 81 days".

Micro-climate factors were assured at close levels to physiological necessary of hen broiler chickens, the recorded deviations not affecting their health state.

Under the aspect of mean weight at slaughtering, also Ross-308 hybrid recorded the best results (3.18 kg in summer season and 3.21 kg in winter one), followed by Hubbard (2.99 kg and respectively 3.08 kg) and by HB Color (2.57 kg and 2.64 kg), in correlation with realized weight mean gains (38.52-38.89 g/head/day at Ross-308; 36.42-37.53 g/head/day at Hubbard; 32.86-32.10 g/head/day at HB Color).

Consumption of mixed fodders was, also, better at Ross-308 chickens (mean consumption=100.54-100.02 g m.f./head/day; total consumption=8144-8102 g m.f./period); very closed were placed the consumptions of Hubbard chickens (mean consumption=106.72-107.31 g m.f./head/day; total consumption=8644-8692 g m.f./period) and at a great distance by the ones of HB Color hybrid (mean=110.77-113.2 g m.f./head/day; total=8972-9169 g m.f./period).

The rate of outflows from flock was of only 4.10-6.84% at Hubbard hybrid, face to 9.13-10.68% as it was at HB Color and especially of 12.21-12.50% at Ross-308.

Transport to slaughter house affected least Hubbard chickens (outflows from flock=0.57-0.76%; weight losses=0.47-0.59%) and most HB Color chickens (outflows from flock=1.15-1.68%; weight losses=1.80-2.14%); at hybrid Ross-308 were recorded intermediary values, both for outflows from flock (0.96-1.22%), as well as for the weight losses (0.71-1.17%).

Regarding slaughtering yield, the obtained values were better at chickens with fast growing Ross-308 type (68.60-70.08%), than at the ones with slow growing (67.24-67.76% at Hubbard and 62.65-61.02% at HB Color), as well as abdominal fat content (2.68-2.73% at Ross-308; 2.33-2.37% at Hubbard; 2.09-2.12% at HB Color).

Chemical analysis effectuated on meat obtained after chickens' slaughtering revealed the superiority of hybrids with slow growing. So, the highest dry matter content was at Hubbard chickens (32.04-32.33%), like the protein one (20.88-21.02%); followed by the meat of HB Color chickens (DM=30.17-30.25%; proteins=20.08-20.17%) and the one of Ross-308 chickens (DM=29.87-29.98%; proteins=19.74-19.98%).

Content in lipids was higher at HB Color (10.02-10.18%) and lower at Hubbard (8.20-8.64%) and Ross-308 (7.07-7.29%). Chemical composition influencing both meat caloricity (121.48-128.73 kcal/100 g at Ross-308; 135.14-140.34 kcal/100 g at Hubbard; 146.27-158.78 kcal/100 g at HB Color), as well as the rate of losses by thermal treatment (32.4-32,8% at Ross-308; 27.1-27.3% at Hubbard; 27.8-28.1% at HB Color).

Hybrids with slow growing had a more finesse meat through the perspective of muscular fibers thickness (2.07-2.08 μ at Hubbard and 2.12-2.14 μ at HB Color), in comparison with the one of Ross-308 chickens (2.44-2.45 μ).

The only hybrid at which those two growing series were finished with a positive economical balance was Hubbard, the other genetic variants recorded losses.

The final conclusions detached from our research could be synthesized as follows:

- in comparison with fat growing (industrial) for hen broiler, slow growing contribute to improvement of final product quality (superior aroma and texture of meat; reduced incidence of myopathies and pododermatitis) and assure the welfare condition (lower densities on square unit; increasing of slaughtering age; access to natural light during summer; diminishing of mortality rate as robustness indicator; decreasing of daily mean gain under 50 g by utilization of fodders with low energetic and protein levels);
- Ross-308 industrial hybrid is not adequate for slow growing, because consume more fodder, in conditions of a reduced growing gain (realized corporal weights lower with 3.8-15.0%, mean growing daily gains inferior with 4.6-14.4% and feed conversion indexes higher with 10.4-22.1%

in comparison with the data presented in rearing guide). This hybrid needed very high production costs and didn't allow the differentiation at shelf with standard grill chicken (non-uniformity of colour and typical shape of carcass), hence the negative recorded economical balances;

- HB Color hybrid is fragile in terms of digestive health, sensitive at temperature variations, have a low slaughtering yield, numerous defects of carcass (chest bursitis) and a higher quantity of bones, which not qualify it under the aspect of economical efficiency; also this hybrid was far below its theoretical performance (weight at slaughtering lower with 5.0-12.9%, DMG lower with 5.1-11.5% and food conversion indexes higher with 1.3-21.6%);
- Hubbard hybrid responded best to slow growing conditions, having corporal weights, growing gains and conversion indexes lower with only 0.6-3.9%, 0.7-4.0% and respectively, with 2.0-3.9% face to the guide; we mentioned that those two series of chickens slaughtered at the age of 63 days and the one grown in cold season till the age of 81 days realised conversion indexes better with 0.3-4.2% than the ones presented in hybrid's guide. Commercially speaking, Hubbard avowedly differentiated by the rest of tested hybrids, because is very much alike with the chicken obtained in peasant's households, from where the superior economical results.

Based on the general conclusions detached from effectuated investigations we could make the following recommendations for practice of hen broiler rearing:

- production of bird meat by application of principles of slow growing technology for hen broiler;
- utilization of Hubbard hybrid for obtaining of bird meat in conditions of applying of slow growing technology;
- slaughtering of hen broiler with slow growing (Hubbard in particularly) at the age of 63 days, because assure the best technical-economical efficiency for rearing a meat with the best quality.