

SENSORIAL EVALUATION OF MEAT GATHERED FROM SLOW GROWING HEN HYBRIDS

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Abstract

Sensorial appreciations were carried out by a specialized team of tasters, through specific methods for those type of evaluation. Were utilised meat samples gathered from pectoral musculature from three hen hybrids (Ross-308, Hubbard and HB Color) reared in extensive system (shelters with free access to external paddocks) and slaughtered at different ages (56, 63 and 81 days). Meat of Hubbard hybrid received the highest scores for tenderness (4.68-4.75 points), aroma and savour (4.93-4.96 points) and for consistency (4.73-4.78 points), and the one from Ross-308 for succulence (4.13-4.33 points). The lowest scores were obtained by meat from HB Color in case of tenderness (3.63-3.68 points) and succulence (3.05-3.25 points) and respectively, at the one from Ross-308 for aroma and savoury (4.23-4.53 points) and consistency (3.60-3.70 points). Regarding the influence of slaughtering age on sensorial features of meat was observed that increasing of poultry growing period diminished the score given for three analysed, with the exception of aroma and savour which became more intense while chickens advanced in age. The conclusion of the current study was the rusticity of hybrids with slow growing allow to obtain a meat with superior sensorial features than the one gathered from industrial type hybrids, a special being given to Hubbard hybrid.

Key words: hybrids, extensive, meat, sensorial features

INTRODUCTION

During time, obtain of poultry meat passes from traditional extensive rearing to semi-intensive type exploitation and finally to intensive-industrial type one [12].

The goal focused in this transition was to maximize the potential of meat poultry to obtain some superior productive performances, into a shorter time; this phenomenon was based on creation of new high valued gene-types, on improving of rearing and feeding technologies, but also were made progresses regarding assuring of health state, bio-security and welfare [11, 12].

Continuous decreasing of slaughtering age and improvement of feed conversion index leded to economic profitability of hen broiler rearing [11].

On “poultry meat” connection appeared separation segments imposed by market demands for diversification (carcass, cut parts, minced meat, specialities or elaborated products) [1, 2, 6].

These factors determine apparition of a diversified technology for meat poultry rearing such as “Label Rouge” technology, ecological technology, in different variants of “Certified chicken” with specific demand for obtaining [8, 9].

Companies which produce poultry meat are confronted with the increasing of social pressures and customers demands, whom want new attributes from foodstuff products which they consume [5, 7].

In the last period, a greater interest is given to meat sensorial features and which actually represent the first “analysis bulletin” which is at the disposal of consumer, offering real data regarding products’ freshness and quality, influencing the achievement decision [4, 10].

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Meat sensorial analysis consist in an objective and reproducible verification of all the conditions required by meat technical norms and which could be appreciated based on senses, based on a methodology which will reduce or eliminate the intrinsic errors [13].

From the above mentioned reasons, we aimed to study the way in which genetic type (hybrid) and slaughtering age influence the sensorial attributes of obtained meat, in conditions of an extensive rearing type (in shelters with free access to external paddocks).

MATERIAL AND METHOD

Determinations were effectuated on meat samples gathered from three hen hybrids (Ross-308, Hubbard and HB Color) reared in extensive system (in shelters with free access to external paddocks) till the age of 56, 63 and respectively, 81 days.

Sensorial examination consisted in evaluation of the following parameters:

- tenderness-is appreciated by ease with which meat is masticated and it is determined by breed, race, age, sex, fattening state, meat content in lax conjunctive tissue, quantity and quality of adipose tissue, quality of muscular fibre, slaughtering age;
- succulence-is meat aptitude to cede juice by mastication and depends by meat capacity to retain a certain quantity of intra-cellular, inter-cellular and inter-fascicular juices, as well as by meat content in bound water and fats. Meat of young chicken intensively reared have a higher succulence due to higher content in water;
- aroma and savour-include taste and smell of meat, being influenced by age, sex, rearing conditions, nourishment, presence of ammonia in shelters, as well as by conditions for slaughtering, chilling and storage of meat. In literature is described the influence of refrigeration on taste of poultry meat; loosening of aromatic compounds taking place, mainly, during chilling by immersion; thermal processing conferring different tastes, specific to applied recipe;

- consistency-represent the resistance which meat oppose to deformation by pressing with finger on its surface.

Evaluation was realised on poultry breast samples which were thermal processed for 20 minutes into a preheated oven at +120°C to reach a temperature of +70°C in the samples' geometric centre.

Codified samples were served hot to tasters, into a testing chamber equipped with individual boxes and lights designed to mask the obvious colour differences, with the exception of visual evaluation.

Each of those 10 tasters tested 3 samples in 6 sessions (repetitions), using as specific working methods triangular test, pair test, duo-trio test, sensorial profile or Preference Mapping.

Statistical interpretation of results were realised by using Anova test.

RESULTS AND DISCUSSIONS

1) Meat sensorial features for poultry slaughtered at age of 56 days

Carcass colour was pink to yellow at Ross-308 chickens and yellow at the ones with slow growing (Hubbard and HB Color).

In case of tested hybrids, the best score for tenderness was obtained by Hubbard (4.75 points), followed by Ross-308 (4.45 points) and by HB Color (3.68 points), hence the significant statistic differences between those three batches. Studied character was homogenous ($V\%=4.64-7.85$).

Meat succulence for slaughtered chickens at age of 56 days was appreciated with 4.33 points at Ross-308 (Lc-1), with 3.65 points at Hubbard (Lexp-1) and with 3.25 points at HB Color (Lexp-2), existing significant statistical differences between batches. The lower values of variation coefficient ($V\%=1.77-4.74$) show the homogeneity of character.

From our research resulted that meat aroma and savoury was superior at chickens with slow growing (4.90 points at HB Color and 4.93 points at Hubbard) and a little weaker at industrial chicken Ross-308 (4.23 points), hence the significant statistical differences between Ross-308 and those two hybrids with slow growing; studied character was quite homogenous ($V\%=1.01-9.57$) (tab. 1).

Table 1 Meat sensorial features for hybrids slaughtered at age of 56 days

Quality parameters	Batch	Statistical estimators (n=5)				ANOVA
		$\bar{X} \pm S_{\bar{x}}$	V%	Min	Max	Significance of differences
Tenderness	Lc-1 (Ross-308)	4.45±0.17	7.85	3.9	4.7	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.00$ (significant)*
	Lexp-1 (Hubbard)	4.75±0.14	6.34	4.2	4.9	
	Lexp-2 (HB Color)	3.68±0.09	4.64	3.5	3.9	
Succulence	Lc-1 (Ross-308)	4.33±0.06	2.90	4.2	4.5	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.00$ (significant)*
	Lexp-1 (Hubbard)	3.65±0.09	4.74	3.5	3.9	
	Lexp-2 (HB Color)	3.25±0.03	1.77	3.2	3.3	
Aroma and savour	Lc-1 (Ross-308)	4.23±0.29	9.57	3.4	4.7	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.65$ (NS)
	Lexp-1 (Hubbard)	4.93±0.02	1.01	4.9	5.0	
	Lexp-2 (HB Color)	4.90±0.14	6.75	3.8	4.4	
Consistency	Lc-1 (Ross-308)	3.70±0.04	2.20	3.6	3.8	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=1.00$ (NS)
	Lexp-1 (Hubbard)	4.73±0.05	2.10	4.7	4.9	
	Lexp-2 (HB Color)	4.33±0.09	4.37	4.2	4.6	

In case of analysed meat, consistency was evaluated with 3.70 points for hybrid Ross-308 (V%=2.2), with 4.73 points at hybrid Hubbard (V%=2.1) and with 4.33 points at HB Color (V%=4.37). Between control batch

(Ross-308) and those two experimental batches (Hubbard and HB Color) were identified statistical significant differences.

2) Meat sensorial features for poultry slaughtered at age of 63 days (tab. 2).

Table 2 Meat sensorial features for hybrids slaughtered at age of 63 days

Quality parameters	Batch	Statistical estimators (n=5)				ANOVA
		$\bar{X} \pm S_{\bar{x}}$	V%	Min	Max	Significance of differences
Tenderness	Lc-2 (Ross-308)	4.40±0.16	6.92	4.3	4.9	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.01$ (significant)* Hubbard vs. Color: $\hat{P}=0.52$ (NS)
	Lexp-3 (Hubbard)	4.70±0.09	4.04	4.0	4.4	
	Lexp-4 (HB Color)	3.66±0.22	9.89	3.0	3.8	
Succulence	Lc-2 (Ross-308)	4.20±0.12	5.83	4.0	4.5	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.61$ (NS)
	Lexp-3 (Hubbard)	3.43±0.17	9.64	3.1	3.8	
	Lexp-4 (HB Color)	3.11±0.09	5.88	2.9	3.3	
Aroma and savour	Lc-2 (Ross-308)	4.38±0.15	6.82	4.0	4.7	308 vs. Hubbard: $\hat{P}=0.01$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.57$ (NS)
	Lexp-3 (Hubbard)	4.95±0.06	2.58	4.7	5.0	
	Lexp-4 (HB Color)	4.88±0.11	5.18	4.0	4.5	
Consistency	Lc-2 (Ross-308)	3.51±0.13	7.37	3.2	3.8	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.15$ (NS)
	Lexp-3 (Hubbard)	4.75±0.06	2.66	4.6	4.9	
	Lexp-4 (HB Color)	4.40±0.09	4.14	4.2	4.6	

Carcasses aspect was pleasant, attracting by the yellow colour of skin and fat deposits, with the exception of thighs and hock joints which had a white-pearly coloration, especially at hybrids Ross-308 and Hubbard.

Regarding tenderness, meat of Hubbard chickens recorded the highest score 4.70 points ($V\%=4.04$), followed by the one obtained from Ross-308 with 4.40 points ($V\%=6.92$) and by meat of HB Color chickens with only 3.66 points ($V\%=9.89$); between control batch and those two experimental batches were significant statistical differences.

Succulence of meat gathered from Ross-308 was appreciated with 4.20 points, the one from Hubbard with 3.43 points, and meat from HB Color obtained 3.11 points, again with significant statistical differences between control and experimental batches; also this feature presented a good homogeneity ($V\%=5.83-9.64$).

In case of aroma and savour, meat from Hubbard chickens received the highest score (4.95), face to 4.38 points at Ross-308 and 4.88 points for HB Color; between batch Lc-2 and batches Lexp-3 and Lexp-4 being enlightened significant statistical differences. Values of variation coefficient ($V\%=2.58-6.82$) denote the homogeneity of studied character.

The scores obtained for consistency by meat provided from Hubbard (4.75) and HB Color (4.40) hybrids denote a stronger consistency, in comparison with the one of meat from Ross-308 (3.51 points), aspect highlighted also by the significant statistical differences between batch Lc-2 and those two experimental batches. The analysed characteristic was homogenous at batches level ($V\%=2.66-7.37$).

3) Meat sensorial features for poultry slaughtered at age of 81 days (tab. 3).

Table 3 Meat sensorial features for hybrids slaughtered at age of 81 days

Quality parameters	Batch	Statistical estimators (n=5)				ANOVA
		$\bar{X} \pm S_{\bar{x}}$	V%	Min	Max	Significance of differences
Tenderness	Lc-3 (Ross-308)	4.35±0.17	7.85	3.9	4.7	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.01$ (significant)* Hubbard vs. Color: $\hat{P}=0.00$ (significant)*
	Lexp-5 (Hubbard)	4.68±0.06	2.64	4.6	4.9	
	Lexp-6 (HB Color)	3.63±0.09	5.22	3.5	3.9	
Succulence	Lc-3 (Ross-308)	4.13±0.06	2.91	4.2	4.5	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.00$ (significant)*
	Lexp-5 (Hubbard)	3.38±0.08	3.43	4.2	4.5	
	Lexp-6 (HB Color)	3.05±0.03	1.78	3.2	3.3	
Aroma and savour	Lc-3 (Ross-308)	4.53±0.29	7.58	3.9	4.7	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.65$ (NS)
	Lexp-5 (Hubbard)	4.96±0.02	1.02	4.9	5.0	
	Lexp-6 (HB Color)	4.88±0.14	6.76	3.8	4.4	
Consistency	Lc-3 (Ross-308)	3.60±0.04	2.21	3.6	3.8	308 vs. Hubbard: $\hat{P}=0.00$ (significant)* 308 vs. Color: $\hat{P}=0.00$ (significant)* Hubbard vs. Color: $\hat{P}=0.01$ (significant)*
	Lexp-5 (Hubbard)	4.78±0.05	2.11	4.7	4.9	
	Lexp-6 (HB Color)	4.38±0.09	4.38	4.2	4.6	

Even if the carcass aspect at studied hybrids was a pleasant one, attracting by yellow colour of skin and fat deposits, was observed a non-uniformity of colour, very obvious, at Ross-308 hybrid.

Regarding tenderness, meat provided from Hubbard chickens obtained the highest

score (4.68), followed by the one from Ross-308 with 4.35 points; meat from HB Color was appreciated with a lower score of only 3.63. Character was homogenous ($V\%=2.64-7.85$), but were identified significant statistical differences between those three experimental batches.

For succulence, meat from Ross-308 chickens received the highest score (4.13), followed by Hubbard chickens with 3.38 points and by HB Color with only 3.05 points; also were observed statistic significant differences between those three batches. Character was homogenous, a proof being the lower values of variation coefficient ($V\%=1.78-3.43$).

In case of aroma and savour, also hybrid Hubbard was the most appreciated one (4.96 points), followed by HB Color with 4.88 points and by Ross-308 with only 4.53 points; otherwise, between control batch and the experimental ones were identified significant statistical differences. Character presented a good homogeneity ($V\%=1.02-7.58$).

The obtained score for parameter consistency denote that this one had the higher value at meat provided from Hubbard (4.78 points) and HB Color (4.38 points) and better at the one from Ross-308 (3.60 points). Also this characteristic was homogenous ($V\%=2.11-4.38$), but were founded statistical differences between batches at each of those three effectuated comparisons.

CONCLUSIONS

Data regarding sensorial parameters of meat gathered from hen hybrids subjected to an extensive rearing revealed differences given by genetic type, as well as by slaughtering age.

At hybrid Hubbard, the obtained scores for tenderness were 4.68-4.75 points, the ones for aroma and savour were 4.93-4.96 points, and the ones for consistency were 4.73-4.78 points, higher with 0.30-0.33 points, with 0.43-0.70 points and respectively, with 1.03-1.24 points face to score obtained by Ross-308 hybrid meat and with 1.04-1.07 points, 0.03-0.08 points and respectively, with 0.35-0.40 points face to the score obtained by HB Color meat.

Instead, meat of Ross-308 hybrid received the highest score for succulence (4.13-4.33 points), face to only 3.38-3.65 points as it was for Hubbard meat and 3.05-3.25 points for the HB Color one.

Another conclusion was that three sensorial attributes from the analysed ones

received lower scores with increasing of chickens slaughtering age, exception being aroma and savour which became more intense with chickens' aging.

In conclusion, we could affirm that sensorial features of meat are superior for chickens with slow growing and especially at Hubbard hybrid, consequence of rusticity which characterize these hybrids.

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