E SLAUGHTERING AGE EFFECT ON THE PHYSICO-CHEMICAL PROPERTIES OF BROILER CKENS INTRAMUSCULAR COLLAGEN

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strains of slow growth chickens are analysed (Cou Nu d'Aquitaine, JA 57). The carcass quality and the meat quality are cribed at three slaughtering ages (7, 10 and 13 weeks). The maturity state of the intramuscular collagen is determined measuring its thermal solubility evolution and by analysing its thermal denaturation studied by differential scanning rimetry.

RODUCTION

st collaboration with the "Centre d'Ethologie des Animaux Domestiques" (R. Zayan, Université Catholique de Louvain-euve) had for purpose to study the influence of the slaughtering age and the growth rapidity (slow or rapid growth) on t quality of broiler chickens (BASTIAENS et al, 1991). A second collaboration completes these results and analyses the uence of strain, slaughtering age and sex on meat properties of slow growth broiler chickens. We are especially erested in the significance of these parameters on the characteristics of connective tissue.

TERIALS AND METHODS

chickens grown in 4 stages are equitably distributed according to sex, slaughtering age (7, 10 and 13 weeks) and strain Cou Nu d'Aquitaine and JA 57)

reticulate state of collagen is appraised by thermal solubility measured after 70 minutes at 75°C. The collagen content he soluble and insoluble fractions is determined by the hydroxyproline measuring out (méthod ISO 3496).

Differential Scanning Calorimetry is realised on a 100 mg collagen sample with a SETARAM equipment. The rmogram is recorded between 2 and 110°C. The temperature increases at 2°C per minute and the sensitivity is selected 00 microvolts. The obtained peak can be divided into three surfaces (figure 1) whose S3 increases when the animal t. This area correspond to the breaking of the more thermostable links (BASTIAENS et al., 1990).

SULTS AND DISCUSSION

strain doesn't influence the alive weight and the carcass weight. These ones increase of course with the slaughtering and the females are lighter than the males. The meat yield of the carcass increases with the age. This one is more portant for the strain JA 57 regardless of the age. The differences between sex are variable. The cover fat percentages y weak and rarely pass 1 % of the carcass weight. This percentage raises with the animal age. It's lightly higher for the JA

breast meat tenderness is measured with a texturometer INSTRON 1140 by compression or cutting. These results pared to a panel estimation show a correlation between the meat shear force and the organoleptic analysis results. No ificant difference is observed for the tenderness according to slaughtering age, sex and strain. We think that the different ups, slaughtered at different moments, have been subjected to different stress conditions (climate, waiting time,...). In fact, ns authors have shown the stress influence on the chicken meat quality (MITTAL and BARBUT, 1991; TTENBOOGAART et al, 1991).

The collagen rate, the collagen thermal solubility level and the differential scaning calorimetry (D.S.C.) results are noted at table 1 in function of age, sex and strain.

For the breast muscles, the intramuscular collagen rate bend to decrease when the animal get old (figure 2). This means that the muscular tissue has a more rapid growth that the connective tissue. The intramuscular collagen rate of the JA 57 chickens is lower than for the Cou Nu d'Aquitaine chickens. These animals have a more important meat yield and therefore a more important muscular development. The intramuscular collagen rate of the females is lower than for the males. There isn't significant difference between the thermal solubility of the two strains intramuscular collagen. This ones is lower for the female. The leg muscular collagen is generally more soluble than the breast collagen. For the two types of muscles, the thermal solubility decreases with the age. This phenomenon is equally observed for the bovine meat (BASTIAENS et al., 1990) and is explained by the formation of non-reductible links more stable with heat.

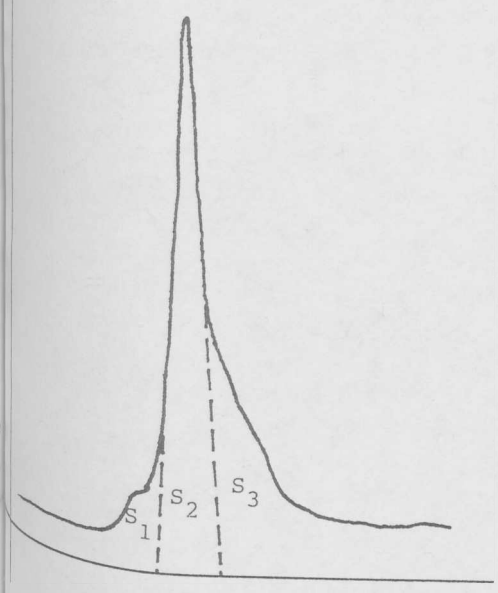
This is confirmed by the D.S.C. results. In fact, the surface S_3 corresponds at the more thermostable links and increases with the chickens slaughtering age. S_3 is stabilized at ± 20 % between 10 and 13 weeks. The connective tissue is then "mature". The stabilization rapidity is dependent of the animal strain or sex.

CONCLUSION

This study shows that the JA 57 strain has a rapider growth than the Cou Nu d'Aquitaine strain. The evolution of the collagen reticulation can be followed by its thermal solubility and by differential scanning calorimetry. If the D.S.C. method is rapider, the smaller sample (100 mg) can be a mistake origine because it's difficult to homogenize the collagen extract. The results show that these animals take a "mature" collagen between 10 and 13 weeks.

Age	Strain	Sex	% Coll. Dry W.	% Coll. Sol. (breast)	% Coll. Sol. (leg)	D.S.C. % S3
7 weeks	COU NU	M	1,9	36,7	36,1	16,5
		F	1,6	33,1	33,8	15,6
	JA 57	M	1,4	35,4	39,9	12,6
		F	1,3	35,1	35,1	11,7
10 weeks	COU NU	M	1,3	33,2	36,1	18,0
		F	1,3	31,8	34,2	20,7
	JA 57	M	1,2	31,3	34,2	20,4
		F	1,0	29,2	32,3	16,4
13 weeks	COU NU	M	1,3	26,2	28,2	20,2
		F	1,0	22,8	27,0	20,4
	JA 57	M	1,2	25,9	29,7	19,6
		F	1,0	23,9	25,7	20,2

Table 1 : Collagen analysis results



ure 1 : Thermogram of a bovine skin collagen.

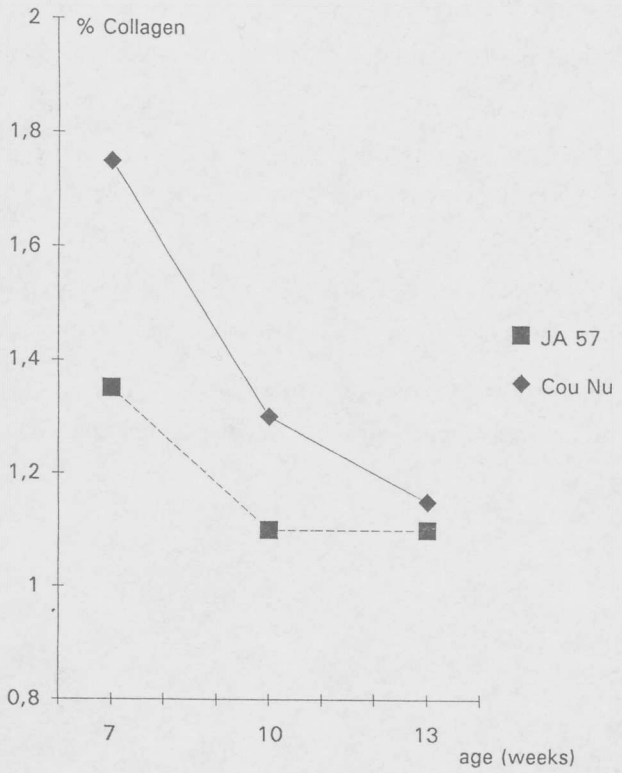
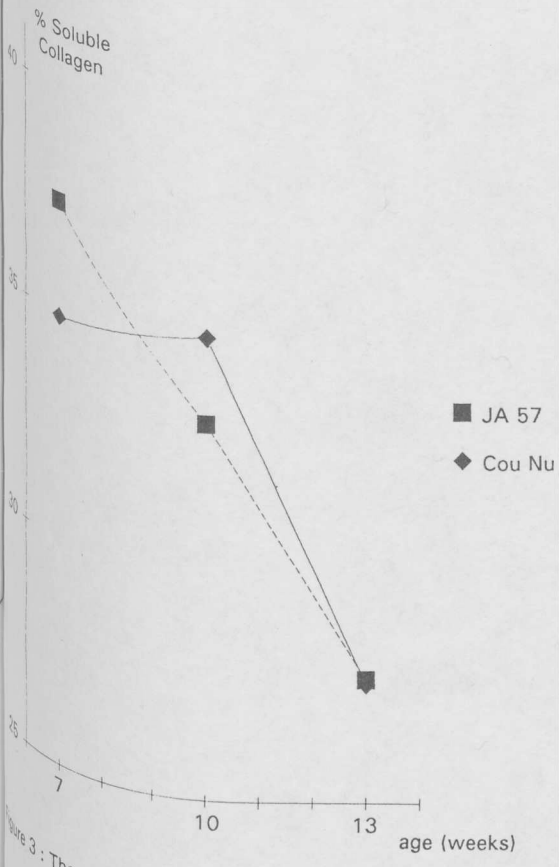


Figure 2 : Percentage of the collagen on dry weight of the breast meat.



ure 3 : Thermal solubility of the leg muscles collagen.

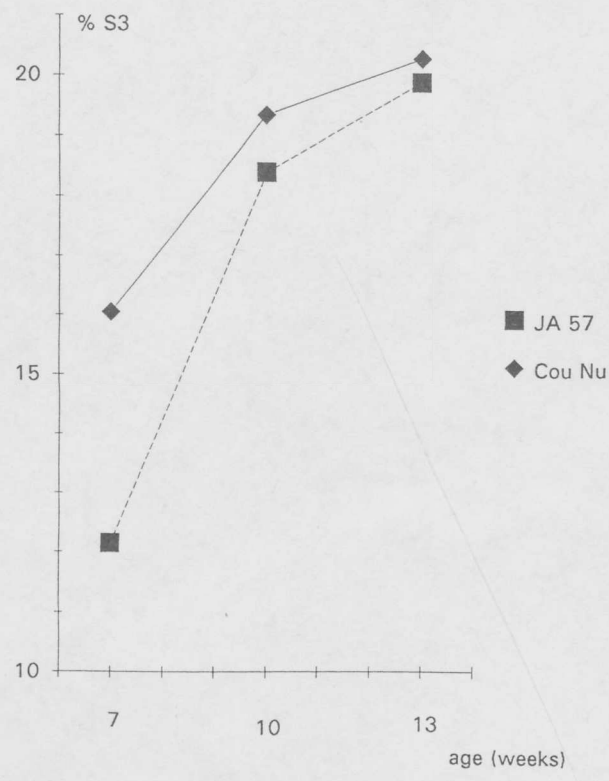


Figure 4 : Surface S3 of the D.S.C. peaks of leg muscles collagen.

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