

Correlation between drying rate and organoleptic properties of "Jambon d'Ardenne".

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The Royal Decree 1974-02-04 in Belgian legislation recognizes the guaranteed source designation "Jambon d'Ardenne" (Ardenne ham) and lays down the conditions the product must satisfy to qualify for the designation.

What are these conditions?

1. The ham may only be produced by holders of a certificate of origin issued by a certifying body and valid for one year. The "Institut de Contrôle de la Qualité et d'Étiquetage Informatif SC" - Quality Control - Qualité Belgique - is officially invested with the assignment of certifying body for the guaranteed source designation "Jambon d'Ardenne" (Royal decree 1974-02-18).
2. The ham must be produced in the delimited "Ardenne" region.
3. In accordance with the method deriving from local tradition, its steps consist of:
 - curing by dry salting or by immersion in brine (injections are not permitted)
 - aging
 - smoking in natural smokehouses where the hams are exposed to smoke produced from burning sawdust of deciduous trees (oak, beech)
 - drying.

A minimum production time is required for the entire process.

4. The ham must be offered in the traditional shape and must have the chemical and bacteriological properties peculiar to this original processing method. Its main characteristics are: the water/protein ratio, an analytic evaluation of the drying rate and degree of ripening of the product and the 3,4 benzopyrene content, limited to 1 ppb.

5. For sale, the product must bear the seal of authenticity issued by Quality Control.

Ardenne ham with the guaranteed source designation is marketed in three types:

- bene-in ham (red Quality Control seal)
- cushion (yellow Quality Control seal) or "cœur d'Ardenne"
- knuckle (grey Quality Control seal) or "noix d'Ardenne"

The production of Ardenne bene-in ham remains only with a few craftsmen curers in the Ardennes. The most commonly marketed product is the ham cushion and this has been used for the present work.

The processing time of an Ardenne ham varies according to the weight of the part and the external conditions. The law imposes a minimum processing time of 4 months for the bene-in ham weighing more than 4 kg at time of sales, 8 weeks for the cushion weighing 2,5 kg at time of sales and 3 weeks for the knuckle weighing 0,8 kg at time of sales. In normal practice, the processing time for a cushion weighing 4 kg (final weight) is usually 12 weeks.

Aim

The aim of our work was to determine the effect of the drying rate on the organoleptic characteristics of the finished product, and to evaluate the correlation between the objective, qualitative, physical and chemical parameters and the sensory appreciation of the finished product.

A batch of 24 cushions was processed according to the traditional Ardenne method:

- after cutting and the first trim (average weight of parts after trimming: 5,3 kg)
- curing by dry salting with a mixture of sodium chloride and nitrite, added with herbs and spices
- aging
- desalting under running water (tap water)
- second trim and shaping (in particular removal of aitch-bone).
- smoking and
- drying.

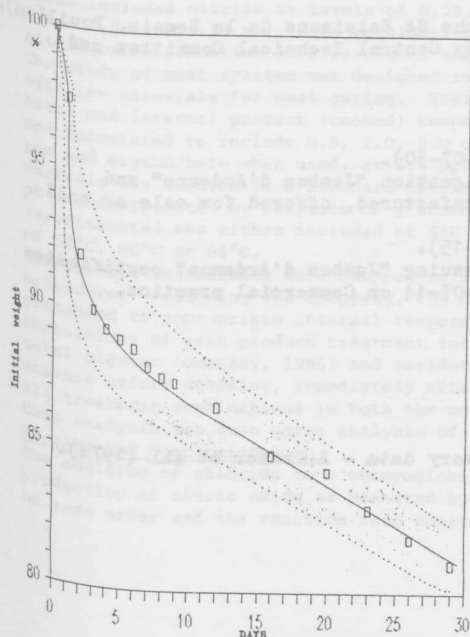
The drying times were kept between 8 and 29 days.

The pH of the cushions was measured before curing and at the end of the processing on products submitted to the sensory evaluation.

The pH did not vary during processing. This points towards the fact that the internal changes are essentially biochemical.

During drying the weight loss of the batch was monitored.

Figure 1: Evolution of the water content of the product as a function of drying time.



Six Ardenne cushions dried in different periods of time - from 8 to 29 days - were analysed and organoleptically evaluated. They were analysed according to the analytical criteria: water/protein ratio after fat removal, intramuscular fat, ash, chloride, water activity and pH. The six products were evaluated by a tasting jury i.a. a trained and an untrained taste panel. The untrained taste panel (15 persons) ranked the products using an overall hedonic appreciation. The results were evaluated according to the Kramer Rank Sum statistical method (level of significance 5%). The trained taste panel (13 persons) evaluated the products by comparison with a standard and judged the colour, odour, texture, taste and salt taste and issued a global appreciation. The answers of this panel were evaluated by the statistical signs test.

Table 1: Comparison between the analytical values of Ardenne cushions and the taste panel appreciation.

Samples	1	2	3	4	5	6	Standard
Drying time (days)	8	12	20	23	26	26	29
Processing time (total in days)	65	69	77	80	83	83	86
<u>Analytical data</u>							
- Moisture (%)	65,2	61,7	60,6	60,8	61,3	59,6	59,6
- Protein in product i.e. (%)	24	24,1	24,7	25	25,7	25,2	26,8
- Intramuscular fat in product i.e. (%)	3,4	6	6,2	6,1	5	6,3	5,1
- Ash in product i.e. (%)	7,4	8,2	8,7	8,5	8,5	9,2	9,1
- NaCl in product i.e. (%)	6,6	7,3	7,7	7,5	7,4	8,2	8,0
- Water/protein ratio	2,72	2,56	2,45	2,43	2,38	2,36	2,22
- Aw	0,90	0,86	0,85	0,87	0,85	0,88	0,88
- pH	5,66	5,64	5,60	5,68	5,65	5,44	5,77
<u>Tasting overall appreciation</u>							
* untrained taste panel order of preference		1					
* trained taste panel preference for sample		*					

Conclusions

The conclusions of the trained and untrained panels both pointed towards the same product which seemed to be significantly preferred by the tasters. This Ardenne cushion showed an analytical value of 2.56 for the water/protein ratio.

The appreciation of the texture of the product is influenced by the water/protein ratio. The sensory evaluation outlines an optimum zone for this ratio. Beyond the extreme values for the water/protein ratio 2.3 to 2.6, the product seems to be less appreciated by the tasters. The water/protein ratio shows itself to be an extremely important quality factor.

This work shows the close correlation between the objective criterion water/protein ratio and the consumers' qualitative appreciation.

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References

Belgian legislation

- Law of 1971-07-14 on Commercial Practice (Moniteur Belge 1971-07-30).
- Royal Decree 1974-02-04 recognizing the guaranteed source designation "Jambon d'Ardenne" and establishing the conditions the product must satisfy to be manufactured, offered for sale or sold under this designation. (MB 1974-02-22).
- Royal Decree 1976-04-07 amending RD of 1974-02-04 (MB 1976-05-15).
- Royal Decree 1974-02-18 certifying the body responsible for issuing "Jambon d'Ardenne" certificates of origin in performance to Article 16 of the Statute of 1971-07-14 on Commercial practice.

Analyses

moisture NF (norme française) V - 04 - 401
fat NF - V - 04 - 403
ash NF - V - 04 - 404

Statistics

Parametric ranking method for the statistical evaluation of sensory data - A.Kramer et all (1974).
Sign Test NF - X - 06 - 065.