Abstract – Comparison between Standard and Label rabbits : Chemical, rheological and sensory characterisation- S. Combes[1], N. Jehl[2], H. Juin[3], L. Cauquil[1], and Lebas F.[1] (**1** INRA Toulouse 31320 Castanet-Tolosan; **2** ITAVI 28, rue du Rocher 75008 Paris; **3** INRA Magneraud 17700 Surgères, France)

Chemical, rheological and sensory traits of meat from rabbit raised according to the French "label" norms of production were compared with those of "standard" type rabbits. 24 "standard" and 24 "label" rabbits were slaughtered at the same weight (2,35 kg) but different ages (respectively 10 or 13 weeks old). Animals were reared in cage (0.76 m x 0.45 m) for "standard rabbits" or in pen (0.9 m x 2 m) for "label rabbits" at the same density (16 rabbit / m^2). Shear-force measurement (1 cm^2 core sample), and cooking loss on *Longissimus dorsi* (LD), electrical conductivity (TOBEC value), lipids and dry matter content on hind leg crushed meat were determined using the right side of rabbit carcasses. Sensory evaluation was carried out by a trained panel of 12 tasters on LD muscle and hind legs from the left side of carcasses. Two different cooking processes were compared (vacuum packed before cooking in an humid oven or grilled for 5 minutes before cooking in an humid oven). Shear-tests parameters allowed a significant discrimination between the two groups when performed on raw LD ($P<0,05$) but not on cooked LD (Table 1). The most discriminate trait between "label" and "standard" rabbits is the cooking loss measurement ($P=0,002$). Chemical analyses and TOBEC values did not differ between the two groups of rabbits. The lack of correlation between TOBEC measurements and lipid content ($r=-0,07$) prevents us from validating this method for the estimation of the lipid content of crushed meat.

In our condition, cooking process did not significantly influence sensory scores. Results were pooled by rearing system (Table 2). LD meat from "label" rabbits was less juicy and stickier compared to "standard" animals. On the opposite, hind leg meat did not allow to discriminate the two groups. There was no correlation between sensory scores and chemical or rheological traits except between E value and juiciness in hind leg ($R= -0.218$ $p=0.03$ $n=93$).

Table 1. Shear-force measurement and cooking loss on LD ; TOBEC value, dry matter and lipids contents on crushed hind leg meat (mean ± sem).

	Label (n = 24)	Standard (n = 24)	Group effect
Raw LD			
Maximum stress (N/cm^2)	16,2 ± 4,6	13,9 ± 2,6	0,03
Energy at maximum force (mJ)	60 ± 15	51 ± 9	0,02
Cooked LD			
Maximum stress (N/cm^2)	34,6 ± 13,0	38,3 ± 11,8	NS
Energy at maximum force (mJ)	73 ± 31	81 ± 28	NS
Cooking loss (%)	26,7 ± 4.0	30,3 ± 3,1	0,002
Crushed hind leg meat			
TOBEC value	410,8 ± 1,6	410,9 ± 1,2	NS
Dry matter (%)	25,56 ± 0,07	25,70 ± 0,08	NS
Lipids content (%)	3,06 ± 0,16	3,46 ± 0,19	NS

In conclusion "label" compare to "standard" rearing system had little effect on sensory characteristics of rabbit meat. The most effective measures to discriminate the two groups were shear force measurement on raw meat and cooking loss determination.

Table 2 : Incidence of the rearing system on sensory traits (mean ± sem) of rabbit LD and hind leg (1=very low intensity; 10 =very high intensity)

	Label (n=48)	Standard (n=48)	Group effect
LD			
Tenderness	4.6 ± 1.8	4.4 ± 1.7	NS
Juiciness	2.3 ± 1.5	2.8 ± 1.7	P<0.05
Flavour	5.0 ± 1.6	4.7 ± 1.5	NS
Fibrous trait	2.5 ± 1.8	2.6 ± 2.1	NS
Sticky trait	2.1 ± 1.6	1.7 ± 1.3	P=0.06
Hind leg			
Tenderness	5.2 ± 1.9	5.1 ± 1.7	NS
Juiciness	3.1 ± 1.9	3.4 ± 1.9	NS
Flavour	5.0 ± 1.6	4.9 ± 1.6	NS
Fibrous trait	1.9 ± 1.4	2.0 ± 0.9	NS
Fat trait	0.9 ± 0.7	1.1 ± 0.9	NS

Comparison between standard and label rabbits : Chemical, rheological and sensory characterisation

Combes S.[1], Jehl N.[2], Juin H.[3], Cauquil L.[1] and Lebas F.[1]

1. INRA Toulouse 31320 Castanet-Tolosan
2. ITAVI 28, rue du Rocher 75008 Paris
3. INRA Magneraud 17700 Surgères; France

Institut National de la Recherche Agronomique

What is the French « Label Rouge » ?

Definition

Not a brand but an official stamp

Recognized and control by the French Ministry of Agriculture

Guarantee of quality, taste, safety, hygiene and welfare

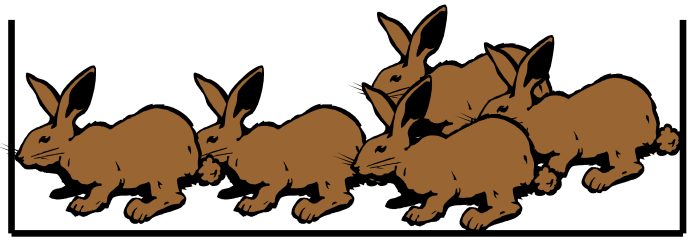
Necessity to prove a difference of sensory quality compare to the « standard » production

For rabbits

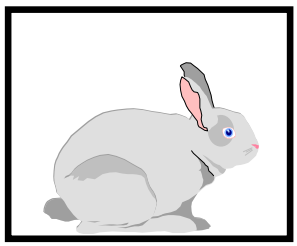
Only small production (4 red label brands)

Fundamental principles

- rabbits minimum slaughter age at **91** days
- rabbits must be issued from special breeds selected for their **low growth rate** and **high meat quality**
- rabbits would receive specific complete feeds with limitation of antibiotics utilisation
- fattening rabbits are generally reared in **pens**, with or without access to an outside area

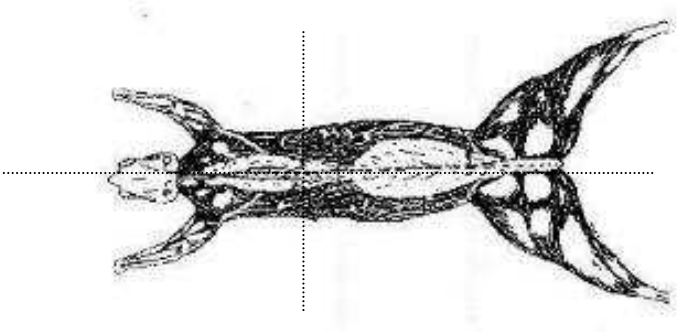


94 days

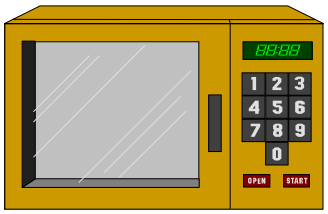


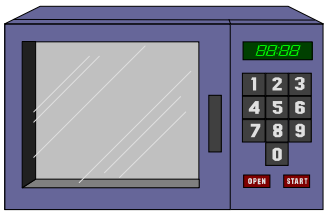
73 days

Slaughtering

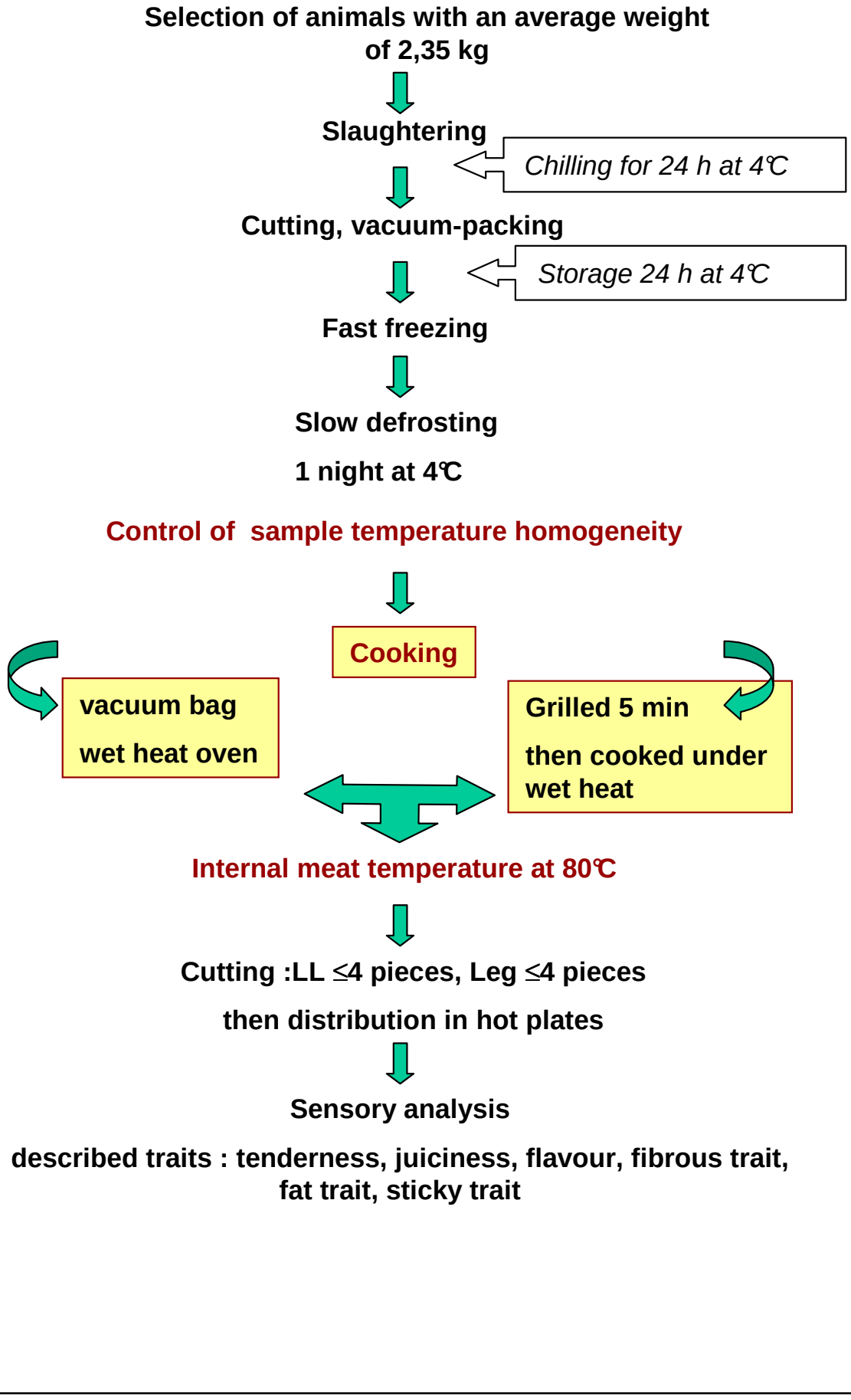


freezing





Sensory analyse


Selection of animals with an average weight of 2,35 kg
Slaughtering
Chilling for 24 h at 4℃
Cutting, vacuum-packing
Storage 24 h at 4℃
Fast freezing
Slow defrosting
1 night at 4℃
Control of sample temperature homogeneity
Cooking
vacuum bag
wet heat oven
Grilled 5 min
then cooked under wet heat
Internal meat temperature at 80℃
Cutting :LL ≤4 pieces, Leg ≤4 pieces
then distribution in hot plates
Sensory analysis
described traits : tenderness, juiciness, flavour, fibrous trait, fat trait, sticky trait

Hind leg

Quick defrosting

1 hour under tap water

Dry matter

Lipids content

ToBEC measurement

Back

Quick defrosting

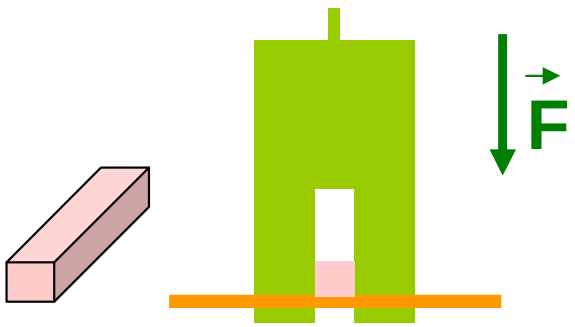
1 hour under tap water

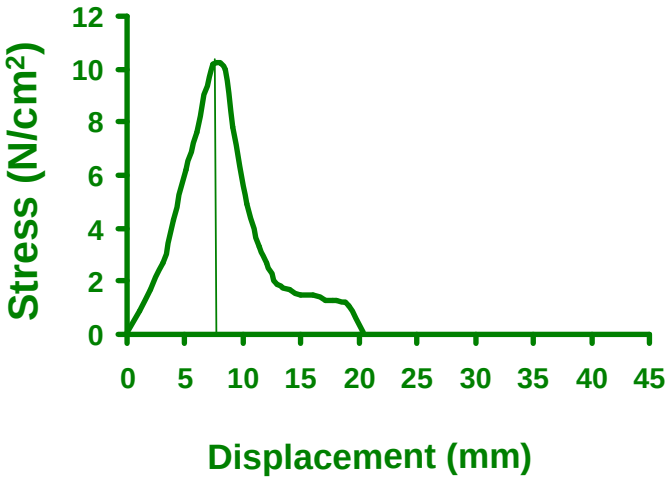
LL isolation

Warner-Bratzler tenderness

- **raw meat**
- **cooked meat**

Cooking loss

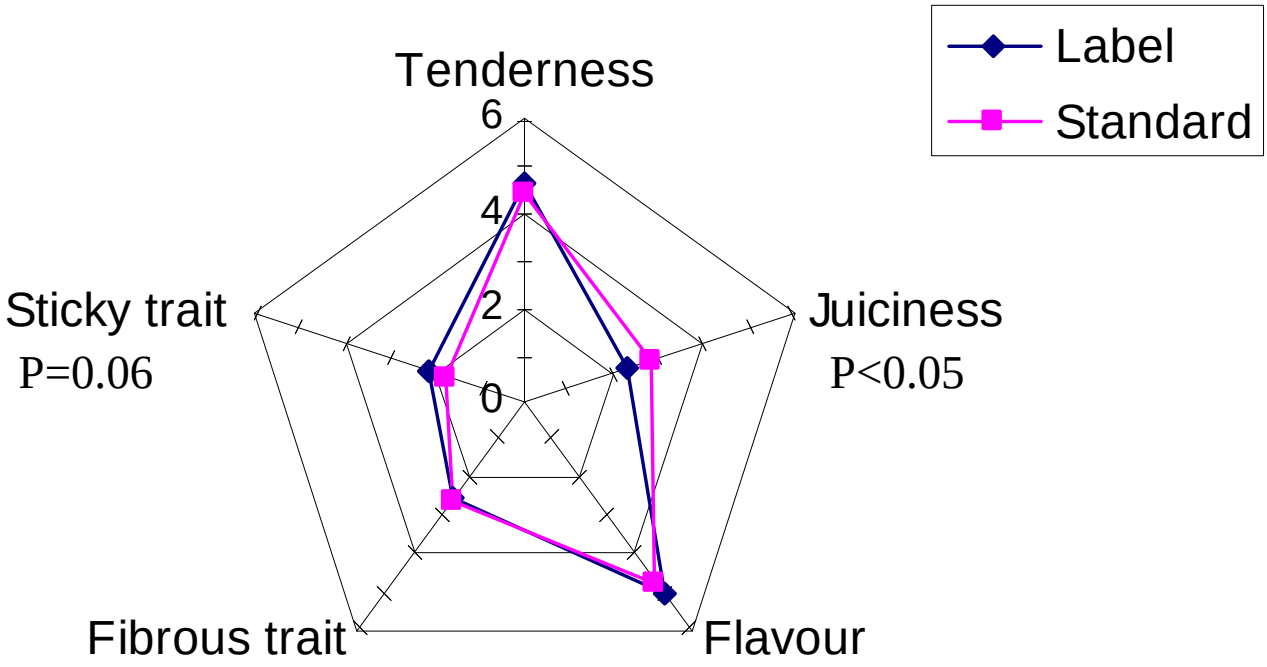




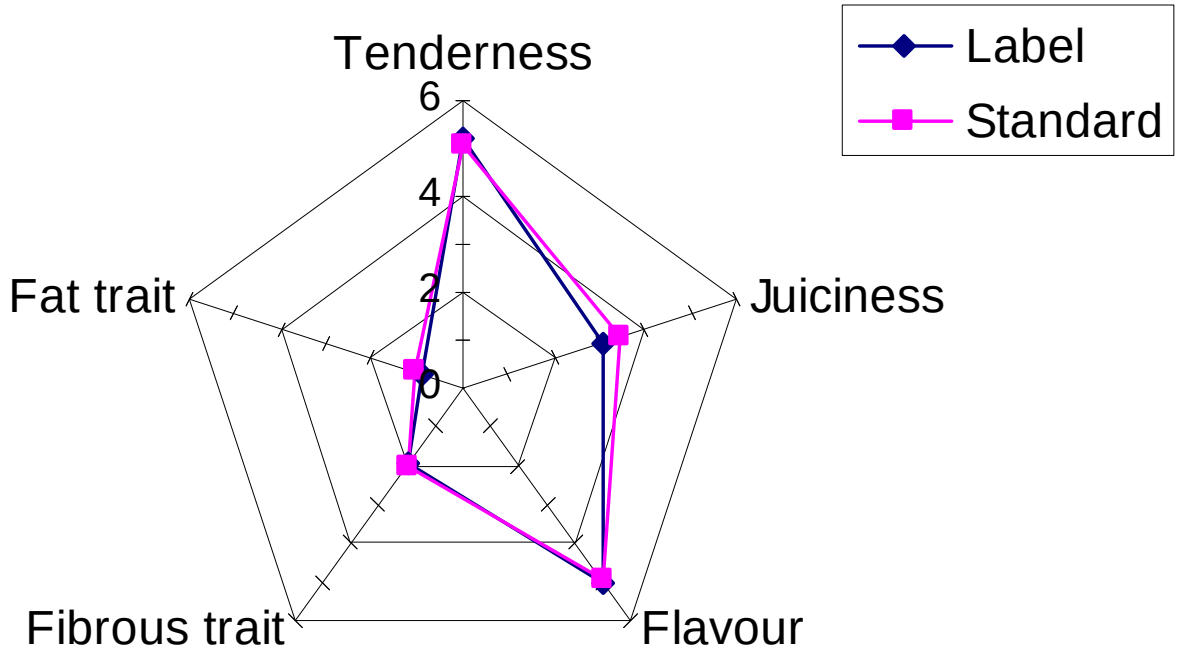
Use of temperature registrer

Cooking with temperature sound

longissimus lumborum



Hind leg



Rheologic, physical and chemical analysis

(n=24)	Label	Standard	Group effect
Raw LL			
Maximum stress (N/cm^2)	16,2 ± 4,6	13,9 ± 2,6	0,03
Energy at maximum force (mJ)	60 ± 15	51 ± 9	0,02
Cooked LL			
Maximum stress (N/cm^2)	34,6 ± 13,0	38,3 ± 11,8	NS
Energy at maximum force (mJ)	73 ± 31	81 ± 28	NS
Cooking loss (%)	26,7 ± 4.0	30,3 ± 3,1	0,002
Crushed hind leg meat			
TOBEC value	410,8 ± 1,6	410,9 ± 1,2	NS
Dry matter (%)	25,56 ± 0,07	25,70 ± 0,08	NS
Lipids content (%)	3,06 ± 0,16	3,46 ± 0,19	NS

Correlations between parameters

Hind leg (n=93)	Juiciness	Flavour
E ToBEC	-0.218 p=0.03	-0.17 p=0.09

Raw LL (n=48)	Juiciness
Energy at maximum force	-0.265 p=0.06

Cooked LL (n=45)	Flavour	Cooking loss
Maximum stress (N/cm^2)	-0.259 p=0.07	0.517 p<0.001
Energy at maximum force	-0.29 p=0.04	0.499 p<0.001

Conclusions

↙ low incidence of the cooking process on sensory score

↙ label / standard :

- little sensory differences only in LL (juiciness and sticky trait)
- Shear force and cooking loss discriminate both groups
- Weak correlation between analyzed parameters

Studies in progress

Comparison between 3 rearing systems

	Standard	Label	Petit Russe
Slaughter weight	2,3 kg	2,3 kg	2,3 kg
Slaughter age	71 j	92 j	140 j
Maturity degree	51 %	63 %	88 %
Housing	cages	pens	hutches

- **Chemical, physical, rheological and sensory analysis**
- **To identify the most discriminating measure or combination of measure**
- **Research of the best correlations between sensory scores and laboratories analysis**

Studies in progress

Organic Agriculture

- **Meat quality aspect : Chemical, physical, rheological and sensory analysis**
- **Pathology, Nutrition and Reproduction**