

HARMONIZATION OF CRITERIA AND TERMINOLOGY IN RABBIT MEAT RESEARCH

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SUMMARY :

The harmonization of rabbit carcass criteria is a result of an international work. Its task was to specify the main traits to be considered from the birth of the animal to carcass analysis, to define these traits with enough accuracy and to propose a common terminology. Work on harmonization has been initialized by the Mediterranean Rabbit Group Conference (BLASCO, OUHAYOUN and MASOERO, 1992), completed by several research teams and, finally, discussed during a round table of the Vth World Rabbit Congress (Corvallis, 1992). The

proposal described in this work concerns : 1- growth, consumption and breeding measurements, preslaughter handling and slaughter processing, 2- dressing percentage analysis, 3- measurements or prediction of commercial and reference carcass composition. The work represents an official document of the World Rabbit Science Association. A commission has been created to examine the efficiency of the proposed criteria and to modify them according to what the scientific development and the practical experience or their use would recommend.

RESUME : Harmonisation des critères et de la terminologie utilisés dans les recherches sur la viande de lapin.

L'harmonisation des critères concernant la carcasse du lapin est le résultat d'un travail international. L'objectif est de préciser les principaux caractères qu'il convient de fournir pour décrire l'animal de la naissance à la carcasse, de définir ces caractères avec une précision suffisante et de proposer une terminologie internationale commune. Ce travail d'harmonisation débuta à l'initiative du Groupe Méditerranéen de Chercheurs Cunicoles (BLASCO, OUHAYOUN et MASOERO, 1992), fut complété par plusieurs réunions de travail et

finalment discuté en table ronde au 5^e Congrès de la World Rabbit Science Association à Corvallis (U.S.A) en 1992. Ce travail décrit : 1 - Les mesures de croissance, de consommation et d'élevage, les manipulations précédant l'abattage puis l'abattage lui même. 2 - L'analyse du rendement à l'abattage. 3 - Les mesures ou la prédiction de la composition de la carcasse commerciale et/ou de référence. Il représente un document officiel de WRSA. Une commission a été créée afin d'évaluer l'efficacité des critères proposés, de les modifier en fonction des futurs développements scientifiques et de l'expérience découlant de leur utilisation.

INTRODUCTION

Following a recommendation made by OUHAYOUN and RUDOLPH during the 2nd International Colloquy on "The Rabbit as a Model Animal and Breeding Object" (Rostock, 1982), the IVth World Rabbit Congress (Budapest, 1988) suggested a harmonization of criteria for carcass measurements and retail cuts. This proposal was taken up by the Mediterranean Rabbit Group Conference of the IAMZ-CIHEAM and a Commission was entrusted with the following task:

- * to specify the main traits to be considered from the birth of the animal to carcass analysis,
- * to define these traits with enough accuracy,
- * to propose a common terminology,
- * to establish guidelines for the design of experiments,
- * to prepare a lexicon in four languages.

The results of this Commission were reported in 1990 during a meeting of the Mediterranean Rabbit Group Conference (BLASCO, OUHAYOUN and MASOERO, 1992), and sent to 50 laboratories working on rabbit carcass and meat quality all over the world. After receiving several suggestions, a comprehensive paper on the first three tasks was prepared by OUHAYOUN and BLASCO (1992) for the Vth World Rabbit Congress (Oregon, 1992). After discussion, the paper has been rewritten including some of the modifications which were proposed during the round table of the Vth Congress. The present document can be considered as representative of the official criteria of the World Rabbit Scientific Association. It takes into account the contributions of several research teams: LUKEFAHR (USA), MAERTENS (Belgium), PARIGI-BINI (Italy), SZENDRÖ (Hungary).

A Commission has been created to examine the efficiency of the proposed criteria and to modify them according to what the scientific development and the practical experience of their use would recommend. This Commission will propose to the WRSA further versions of this document, as well as new criteria which would be interesting to harmonize.

HARMONIZATION OF CRITERIA AND TERMINOLOGY

Although the proposal concerns carcass traits, some recommendations for growth, consumption and breeding measurements or definition are given in the first part.

Generally, *it is recommended* to use abbreviations ending by a **W** for ponderable traits, by a **P** for percentage traits and by a **L** for length traits.

1. Breeding conditions and standard measurements on live animals

Age at weaning. The birth of rabbits, even in a planned experiment, takes place within a 2 to 3 day period. However, rabbits are usually weaned on a fixed day of the week. *It is recommended* to specify the number of days between the average day of birth and the day of weaning.

Type of weaning. *It is recommended* to explain how weaning is carried out: taking the mother away, putting the litter in another cage, mixing litters in a cage with a fixed number of rabbits, or otherwise.

Growing period. If the growing period is time-fixed, *it is recommended* to give the number of days from weaning to slaughter.

Rabbit density. *It is recommended* to specify the number of rabbits per square metre at the beginning of the fattening period.

Criteria of elimination. *It is recommended* to describe the criteria used to consider an animal as a runt at birth, weaning or during the fattening period and then to exclude it from the experiment.

Type of feeding. In many experiments it is important to know whether the animals are fed *ad libitum* or restricted, and in the latter case what kind of restriction. It can also be important to determine whether the food is commercial, standard, or home prepared. In both cases *it is recommended* to indicate the diet formulation. It is essential in experiments about nutrition research.

Liveweight (LW) (i.e. LW70 = liveweight at 70 days)

* **Standardized Liveweight.** Liveweight of rabbits at the end of the experimental period. If this period ends at

fixed weight, the weight interval has to be given. *It is recommended* to measure standardized liveweight before fasting or other treatments. Digestive tract content and urinary bladder have to be included, even in studies on body composition (BUTTERFIELD, 1988).

* **Other Liveweights.** If another weight is used as "liveweight" (i.e. slaughter weight after fasting, empty body weight,...), *it is recommended* to describe it clearly.

Fasting. Fasting can be from solids, liquids or both. *It is recommended* to specify the type of fasting and its duration.

Transport to the slaughter house. Slaughter yield and meat quality can be affected by stress or weariness due to transport. *It is thus recommended* to indicate the duration of the transport from the farm to the slaughter house and, eventually, the resting period before slaughter.

Type of slaughter shock. In many countries there are legal norms about slaughter shock to prevent animals from suffering. *It is recommended* to describe the type of shock: electrical (voltage and duration), neck hit or others.

Reference Body Weight (RBW). It is not easy to determine the adult weight. The following points have to be specified: 1- the genetic origin of the animals; 2- the sex (sexual dimorphism can occur at the adult age); 3- the type of feeding (*ad libitum* or restricted, type of food, ...); 4- the season of the experiment; 5- the physiological status of the does (lactation, pregnancy, ...); 6- other factors (special diets, hormonal treatments, ...). Taylor (1985) gives a complete definition of mature body weight: "... weight of a normally grown, skeletally mature, normally active adult animal maintained in a state of body weight equilibrium on a standard diet, in a thermoneutral, disease-free environment with, or adjusted to, a chemical body fat of 20 %". As a reasonable approximation, *it is recommended* to measure liveweight several times (at least four times) at fixed time intervals (i.e. 30 days). If the four measurements do not show any increase, the average can be considered as a "reference body weight", similar to the adult weight in many cases. During the reproductive life of females, the most constant weight occurs 7 days after parturition (COUDERT and LEBAS, 1985); then, *it is recommended* to weigh females at this physiological status.

2. Standard measurements on rabbit meat and carcasses

2.1. Dressing percentage components

Commercial Skin Weight (CSkW). The skin is separated from the head and the body by cutting at the level of the third caudal vertebra and of the distal epiphyses of

radius-ulna and tibia bones. The skin weight includes the weight of the ears, of the distal part of the tail, but excludes the distal part of fore and hind legs. It also includes the weight of some hypodermic fat but excludes scapular fat deposits.

Full Gastrointestinal Tract Weight (FGTW). The full tract weight includes the stomach, caecum and intestinal contents, and the urogenital tract with empty urinary bladder.

Empty Gastrointestinal Tract Weight (EGTW). Weight of the clean and dripped tract.

Hot Carcass Weight (HCW). Weight of the carcass 15-30 min after slaughter. The carcass does not include blood, skin, distal parts of the tail, fore and hind legs, gastrointestinal and urogenital tracts. It includes head, liver, kidneys and the organs located in the thorax and neck (lungs, oesophagus, trachea, thymus and heart). Hind leg section in the middle of the tarsus has the advantage to permit the carcass to be hung by the hind legs for further processing. However, *it is recommended* to cut the hind leg between the distal epiphys of the *tibia* and *tarsus-calcaneus*.

Commercial Carcass Weight (CCW). Weight of the above carcass after chilling for 24 hours in a ventilated cold room (0-4°C) about one hour after slaughter. Washing carcass (i.e. with water) is to avoid. *It is recommended* to hang the carcass during chilling with sufficient air around it.

Drip Loss Percentage (DLP). Difference between Hot Carcass Weight and Commercial Carcass Weight divided by Hot Carcass Weight (x 100).

Dressing Percentage

* Commercial Dressing Percentage (CDP). Commercial Carcass Weight divided by Liveweight (x 100).

* If other carcass weights or live weights are used, it is recommended to describe them clearly. The elimination of the head, for example, has to be made as described further.

2.2. Prediction of carcass composition

Total muscle weight. Commercial carcass weight gives a good prediction for the total muscle carcass weight, the determination coefficient of the prediction equation (R^2) being near 0.9 (BLASCO et al., 1984).

Lean content. Lean content is the most important criterion of carcass classification in pigs, beef, cattle or sheep. This criterion is not as important in rabbits because this animal is very lean compared with the other farm animals (less than 5 % of fat in the carcass). As a consequence, the variability of rabbit lean content

is much lower than in other species. Carcass weight, length measurements, length ratios, retail cut weights or hind leg meat are bad predictors of the lean percentage of the carcass. Some combinations of these measurements in regression equations are, nevertheless, fairly good predictors (BLASCO et al., 1984).

Meat to bone ratio of the carcass. The meat to bone ratio of the hind leg gives a fairly good prediction of the meat to bone ratio of the carcass ($R^2 = 0.6$) (VAREWYCK and BOUQUET, 1982 ; BLASCO et al., 1984). Other carcass measurements give poor predictions of this ratio. The meat to bone ratio of the hind leg can be predicted by the same ratio of the cooked hind leg ($R^2 = 0.7$) when cooking conditions are standardized (under vacuum, 80°C, 2 hrs 30) (OUHAYOUN et al., 1986).

Total dissectable fat. The percentage of perirenal fat is a reasonable predictor of the percentage of dissectable fat in the whole carcass ($R^2 = 0.8$) (VAREWYCK and BOUQUET, 1982).

2.3. Commercial carcass composition

Liver Weight (LvW). Weight of the liver, excluding gall bladder.

Kidney Weight (KiW). Weight of both kidneys without perirenal fat deposits.

Thymus, Trachea, Oesophagus, Lung and Heart Weight (LHW). Weight of these organs.

Reference Carcass Weight (RCW). Weight of the Commercial Carcass minus the head and the above mentioned organs (liver, kidney, organs of chest and neck).

2.4. Reference carcass characteristics

Perirenal Fat Weight (PFaW). Weight of perirenal fat deposits located between carcass cutpoints 1 and 3 (see further).

Scapular Fat Weight (SFaW). Weight of both scapular fat deposits.

Linear measurements (figure 1)

* Dorsal Length (DL). Interval between the atlas vertebra and the 7th lumbar vertebra.

* Thigh Length (TL). Interval between the 7th lumbar vertebra and the distal part of os ischii.

* Lumbar Circumference (LCL). Carcass circumference at the level of the 7th lumbar vertebra.

Carcass Division (figures 2 and 3)

From a commercial point of view, the carcass has to be divided into joints intended to be sold for

Figure 1. Linear measurements

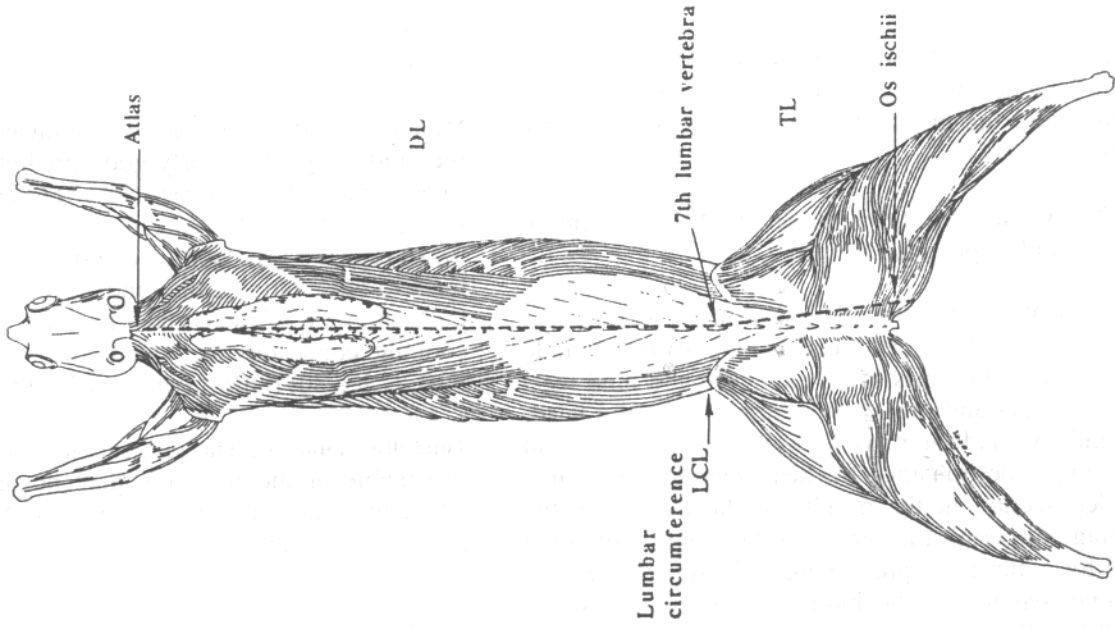


Figure 2. Carcass division
Anatomical division: cutpoints 2 and 3
Technological division: cutpoints 1, 3 and 4

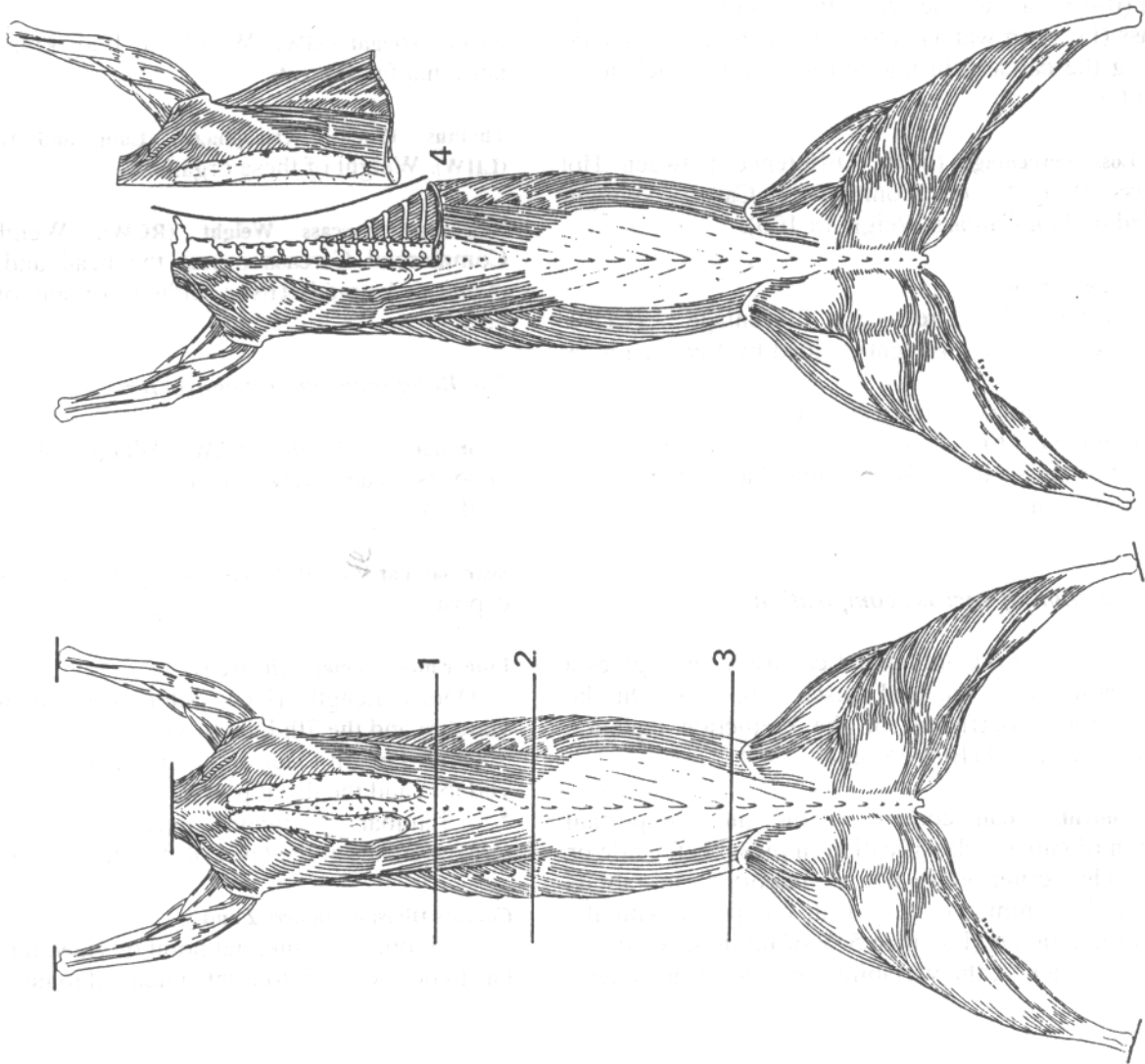
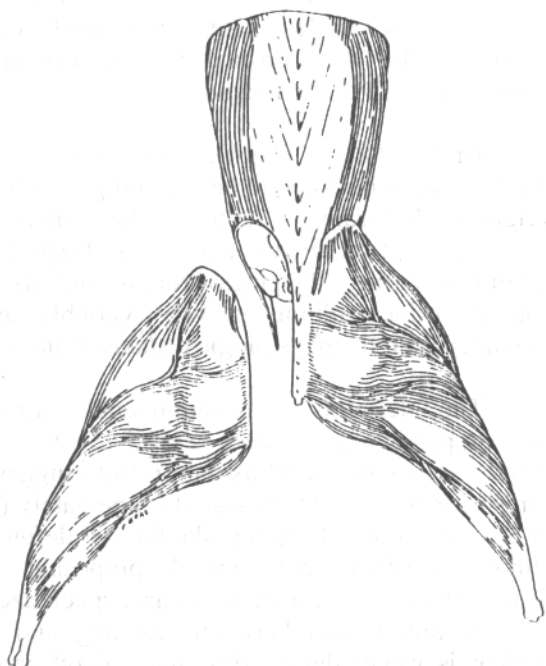
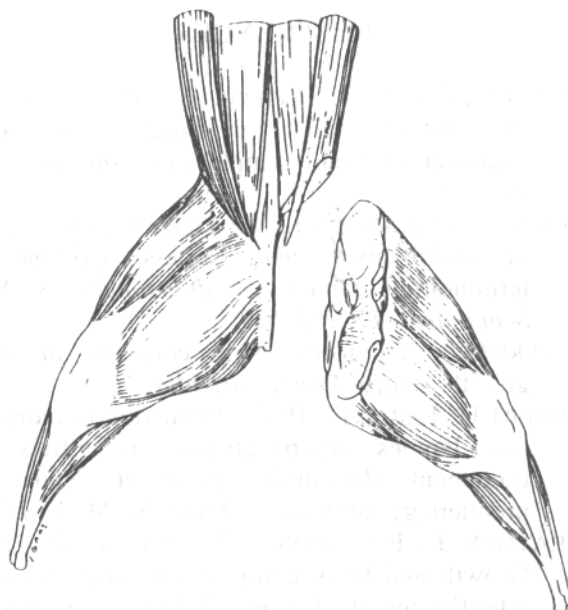


Figure 3. Hindleg separation (cutpoint 5)

Dorsal view



Ventral view



cooking. However, in many scientific papers dealing with relative growth of carcass components and in other carcass studies, a kind of "anatomical" carcass division has been used until now. Both points of view being somewhat complementary, it is recommended to cut the carcass in the following order:

- * elimination of the head: section between *occiput* and *atlas vertebra*,
- * cutpoint 1: section between the 7th and 8th thoracic vertebra, following the prolongation of the ribs when cutting the thoracic wall,
- * cutpoint 2: section between the last thoracic and the first lumbar vertebra, following the prolongation of the 12th rib when cutting the thoracic wall,
- * cutpoint 3: section between the 6th and 7th lumbar vertebra, cutting the abdominal wall transversally to the vertebral column,
- * cutpoint 4: separation of fore legs, including insertion and thoracic muscles,
- * cutpoint 5: separation of hind legs, including *os coxae* and posterior part of *m. iliopsoas* : *m. psoas major* and *m. iliacus (par lateralis and pars medialis)*.

These cuts allow to define head, anatomical and technological joints:
Head Weight (HW)

Anatomical joints (cutpoints 2 and 3)

- * Fore Part Weight (FPW),
- * Intermediate Part Weight (IPW),
- * Hind Part Weight (HPW).

Technological joints (cutpoints 1, 3 and 4)

- * Fore Leg Weight (FLW),
- * Thoracic cage Weight (TW) (without the insertion muscles of fore legs),
- * Loin Weight (LW)
- * Hind Leg Weight (HLW)

The joints can be classified in first retail cuts (hind legs, loin and fore legs) and second retail cuts (limited to thoracic cage).

CONCLUSION

The list of traits given in this paper is not exhaustive, because it is not possible to enumerate the different types of possible experiments. It is not either realistic, to determine a fixed number of compulsory norms which would limit the scope of research studies. However, if a scientist prefers to use different traits or routines, it would be advisable to specify them as specified here. Even though some traits are not used in

some countries, their adoption could favour international exchanges and communication. Some indications constitute general recommendations, some are interesting only in certain experiments or in certain countries, and some of them are highly recommended for all experiments. This list will have to be modified in the future, not only after checking how it works, but also because new developments will take place in the scientific and commercial world.

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MAIN CONTRIBUTIONS MADE BEFORE AND DURING THE ROUND TABLE.

In the initial paper, several traits proposed were a matter of discussion, such as "standardized liveweight", "reference body weight", "commercial carcass", "technological retail cuts". It was not possible to justify in a short paper the reasons for choosing and defining each trait; consequently, all the propositions were open to criticism.

With respect to standardized liveweight, Dr SZENDRÖ (Hungary) proposed fasting conditions before slaughter: 24 hours without pellets and 2 hours (transport time) without water. In the introducing paper, the authors recommended to weigh the rabbit before fasting (easier in most cases) and to give all indications on the fasting method. The authors

considered that Dr SZENDRÖ's proposal, well adapted to his research work on body composition estimation using X-ray tomography is too special and then unacceptable.

An important criterion, particularly in breed comparisons is the reference body weight. Dr OUHAYOUN (France) proposed, on the basis of COUDERT and LEBAS's results (1985), that reference body weight of females could be measured 7 days after parturition, the most constant body weight during the reproductive life of the female.

Dr LUKEFAHR (USA), asked why the urinary bladder should be emptied before full gastro-intestinal weighing. According to authors, the urinary bladder has to be emptied for two reasons: 1- frequently it is perforated during slaughter process and its content lost; 2- urine volume is very variable and not correlated with the physiological status of the rabbit.

The definition of commercial carcass and dressing percentage has been extensively discussed. Dr Szendrő (Hungary) and Lukefahr (USA) suggested that a fresh carcass weight measured immediately (and not 15-30 mn) after slaughter should be defined. The authors justified their initial proposals: at the slaughterhouse, even in an up to date specialized plant, a 15-30 min period between stunning and carcass chilling is usual; during this time, blood and lymph drip from the carcass; consequently, weight loss depending on water evaporation or on any eventual muscular exsudation during chilling has to be measured after this time.

Elsewhere, Dr LUKEFAHR proposed a commercial carcass without head. Dr MAERTENS (Belgium) suggested several calculations for dressing percentage, in particular a dressing percentage with the head, but without eyes. The authors answered that removing the head or not is a commercial, not a scientific choice; in most European countries, the head is not removed in order to limit rabbit meat price. According to consumers opinion, the eyes, as those of fish, give some indications on meat freshness and thus have to be preserved. Pr PARIGI-BINI (Italy) suggested sectioning the hind leg between the tibia and the tarsus-calcaneus but not at the middle of the tarsus. The authors reminded that hindleg section at the middle of the tarsus facilitates carcass hanging during chilling (it also has the commercial advantage to increase dressing percentage) but they accepted Prof. PARIGI-BINI's proposal. Finally, Dr XICCATO proposed that all the percentages considered in the harmonization paper could be calculated using an unique reference, "the standard live weight". The authors confirmed their preference for "commercial carcass" or "reference carcass", which is justified by the low variability (quantitative or qualitative) of these two criteria, compared to that of liveweight.

The authors reminded that their intention was not to fix obligatory norms which could limit scientific freedom! The main recommendations are intended to specify

clearly the criteria used and to supply a sufficient number of measurements to enable the calculation of harmonized criteria.

INTERNATIONAL COMMISSION ON RABBIT CARCASS CRITERIA HARMONIZATION

A scientific group the task of which is to revise periodically the harmonization basis, has been appointed by the round table participants. It includes eleven members:

President:

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Secretary:

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Other members:

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LEXICON

(English, Spanish, French, Italian)

A

Age at weaning / edad al destete / âge au sevrage / età allo svezzamento

Anatomical retail cut / descomposició anatòmica de la canal / découpe anatomique de la carcasse / dissezione anatomica della carcassa

B

Birth / nacimiento / naissance / nascita

Bladder / vejiga / vessie / vescica

Blood / sangre / sang / sangue

Breed / raza / race / razza

Breeding / crianza / élevage / allevamento

C

Cage / jaula / cage / gabbia

Carcass / canal / carcasse / carcassa

Carcass composition / composicion de la canal / composition de la carcasse / composizione della carcassa

Carcass length / longitud de la canal / longueur de la carcasse / lunghezza carcassa

Carcass weight / peso de la canal / poids de la carcasse / peso carcassa

Criteria of elimination / criterios de eliminación / critères d'élimination / Criteri di riforma

D

Dissection / disección / dissection / dissezione
Doe / coneja / lapine / fattrice
Dressing percentage / rendimiento a la canal / rendement en carcasse / resa alla macellazione
Drip loss / pérdidas de escurrido / perte au ressuage / perdite di raffreddamento

E

Empty body weight / peso vivo vacío / poids vif vide / peso vivo vuoto

F

Fasting / ayuno / jeûne / digiuno
Fat percentage / porcentaje de grasa / pourcentage de gras / percentuale di grasso
Fattening / engorde / engraissement / ingrasso
Feed / pienso / aliment / alimento
Feeding (ad libitum, restricted) / alimentación (ad libitum, restringida) / alimentation (ad libitum, restreinte) / alimentazione (ad libitum, razione)
Fore part of the carcass / parte anterior de la canal / avant de la carcasse / anteriore
Forelegs / patas delanteras / membres antérieurs / arti anteriori

G

Gall bladder / vesícula biliar / vésicule biliaire / vésicula biliare
Gastrointestinal tract (full, empty) / tracto digestivo (lleno, vacío) / tractus digestif (plein, vide) / visceri (pieni, vuote)
Growing period / periodo de crecimiento / période de croissance / periodo d'accrescimento
Growth rate / velocidad de crecimiento / vitesse de croissance / velocità d'accrescimento

H

Head / cabeza / tête / testa
Hind part of the carcass / parte posterior de la canal / arrière de la carcasse / posteriori
Hindlegs / patas traseras / membres postérieurs / arti posteriori
Hot carcass / canal caliente / carcasse chaude / carcassa calda

I

Interiliac circumference / circunferencia interiliaca / circonférence interiliaque / circonferenza lombare
Intermediate part of the carcass / lomo / rable de la carcasse / lombata

K

Kidneys / riñones / reins / reni

L

Lactation / lactación / lactation / lattazione

Lean percentage / porcentaje de carne / pourcentage de viande / percentuale di carne

Liver / hígado / foie / fegato

Liveweight / peso vivo / poids vif / peso vivo

M

Meat / carne / viande / carne

Muscle to bone ratio / relación músculo-hueso / rapport muscle-os / rapporto carne-osso

N

Neck / cuello / cou / collo

P

Perirenal fat / grasa perirenal / gras périrénal / grasso perirenale

Pregnancy / gestación / gestation / gestazione

R

Rabbit / conejo / lapin / coniglio

Rabbit density (per cage, m²) / densidad de conejos (por jaula, m²) / densité (lapins par cage, m²) / densità (conigli per gabbia, m²)

Reference body weight / peso de referencia / poids de référence / peso di riferimento

Reference carcass / canal de referencia / carcasse de référence / carcassa di riferimento

Retail cuts (of the carcass) / troceado (de la canal) / morceaux de découpe (de carcasse) / tagli commerciali

S

Scapular fat / grasa interescapular / gras scapulaire / grasso scapolare

Skin / piel / peau / pelle

Slaughter liveweight / peso vivo al sacrificio / poids vif à l'abattage / peso vivo di macellazione

Slaughter weight / peso al sacrificio / poids à l'abattage / peso di macellazione

Slaughtering / sacrificio / abattage / macellazione

Standardised liveweight / peso vivo estándar / poids vif standard / peso vivo standard

Stunning / aturdir / étourdissement / stordimento

T

Technological retail cut / troceado tecnológico de la canal / découpe technologique de la carcasse / tagli commerciali

Total dissectable fat / grasa total disecable / gras dissécable total / totale grasso separabile

Trachea + Thymus + Heart + Lungs / tráquea + timo + corazón + pulmón / trachée + thymus + coeur + poumons / trachea + timo + cuore + polmoni

W

Weaning / destete / sevrage / svezzamento

Whole carcass / canal completa / carcasse entière / carcassa intera