

HARMONIZATION OF CRITERIA AND TERMINOLOGY IN RABBIT MEAT RESEARCH

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INTRODUCTION

Following a recommendation of the 2nd International Colloquium "The Rabbit as a Model Animal and Breeding Object" (Rostock, 1982), the last World Rabbit Congress (Budapest, 1988) has suggested a standardization of criteria for carcass measurements and retail cuts. This proposal has been taken up by the Mediterranean Rabbit Group Conference of the IAMZ-CIHEAM. A Commission has been 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.

Recently, a first report (Blasco, Ouhayoun & Masoero, 1990) has been proposed to world rabbit scientists. The present paper takes into account the contributions of several research teams: Lukefahr (USA), Maertens (Belgium), Parigi-Bini (Italy), Szendrő (Hungary). It only deals with the first three aspects mentioned above.

1- RECENT PAPERS ON CARCASS COMPOSITION (1988-1991)

From 1988 to 1991, in fact since the IVth World Rabbit Congress (Budapest, 1988), 212 research references, concerning keywords organized as follows: [rabbit x (meat + carcass)], have been reported in two important abstract journals: "*FSTA (Food Science and Technology Abstracts)*" and "*CAB (Commonwealth-Bureau of Agriculture)*". Among these references, which represent only a sample of research studies actually conducted in the rabbit, 47 deal with carcass traits. Meat research workers are more interested in genetics and progeny test (15 references), feeding and nutrition (12) or growth and general description of carcass (14), than in breeding (6) or meat technology (4). Most references come from European countries, particularly from Italy (13), France (8), E&W Germany (5) and also from the United States of America (5). These 31 references are listed below.

The aim of this paper is not to present and discuss the results of these works, but to show, on the basis of a few examples, the interest of standardization in rabbit carcass traits and terminology. Three traits are of particular interest in rabbit meat production: slaughter yield, meat to bone ratio and carcass adiposity.

In France, rabbit carcass for commercial purpose is legally defined since 1979: it includes head, liver, kidneys, organs of chest and neck, but excludes distal parts of fore and hind legs. French research workers have adopted this legal definition and decided to go into more details: 1- to eliminate hind leg tips by section between the distal epiphyse of *tibia* and *tarsus-calcaneus*; 2- to include perirenal, inguinal and scapular fat deposits in the carcass; 3- to chill carcasses for 22-24 hrs (0°-4°C) (Brun and Ouhayoun, 1989; Daudin et al., 1990; Ouhayoun et al., 1989). This last procedure enables to estimate shrinkage, an important technological trait in meat production. Slaughter yield is thus the ratio (x 100) of cold carcass, as described above, to liveweight. Fennell et al. (1990) have analysed the carcass definitions used in different countries and confirmed that carcass yield was not calculated in the same way all over the world and even within the United States: Coppings et al. (1989), refer to warm carcass weight, while Lukefahr et al. (1989) and Ozimba et al. (1991) include giblet and abdominal fat in carcass definition. In Italy, the definition of traits vary according to the authors: warm and cold (4°C, 14 hrs) carcass to liveweight (Cavani et al., 1988), cold carcass (4°C, 24 hrs) to empty body weight (Centoducati et al., 1990) or warm carcass to empty body weight (Chiericato and Filotto, 1989).

The muscle to bone ratio is measured by total deboning (Lukefahr et al., 1989), or more often, estimated through deboning of hind leg (Cavani et al., 1988), eventually after cooking (Brun and Ouhayoun, 1989).

Carcass adiposity is mainly deduced from perirenal (abdominal) fat weight, but relative to either hot carcass weight (Chiericato and Filotto, 1989; Lukefahr et al., 1989; Ozimba et al., 1991) or to cold carcass (Cavani et al., 1988; Brun and Ouhayoun, 1989; Centoducati et al., 1990). Recently, Ouhayoun et al. (1989) have proposed an estimation of carcass adiposity using a five level photographic scale : from 1 (no perirenal fat deposits) to 5 (kidneys entirely covered by fat). A moderate correlation was observed between estimation of carcass adiposity and weight of perirenal fat ($r = 0,68$).

2- HARMONIZATION OF CRITERIA AND TERMINOLOGY: A NEW PROPOSAL

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.

2.1. Breeding conditions and standard measurements on live animals

Age at weaning. The birth of rabbits, even in a planified 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 cage or per square

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) (for example 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. 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 %". RBW is difficult to measure in most of the experiments. As a reasonable approximation, *it is recommended* to measure liveweight several times (at least four times) at fixed time intervals (30 days minimum). 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. Nevertheless the following points have to be determined: 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 state of the does (lactation, pregnancy, ...); 6- other factors (special diets, hormonal treatments, ...).

2.2. Standard measurements on rabbit meat and carcasses

2.2.1. 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 full 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). The level of hind leg section is controversial. In most cases, cut is made between the distal epiphyses of the *tibia* and *tarsus-calcaneus*. However, a cut in the middle of the *tarsus* has the advantage to permit the carcass to be hung by the hind legs for further processing.

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 to Liveweight ratio x 100.

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

2.2.2. 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 criterium of carcass classification in pigs, beef, cattle or sheep. This criterium 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, 2.3 hrs) (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).

2.2.3. 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). Commercial Carcass Weight minus the above mentioned organs.

2.2.4. 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

- * 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, without cut in the abdominal wall.

Carcass Division

From a commercial point of view, the carcass has to be divided into joints intended to be sold for 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*, anterior part of *m.psoas major*, but not the lumbar parts of *m.iliacus*.

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. Several traits proposed are a matter of discussion, such are "liveweight", "reference weight", "commercial carcass", "technological retail cuts". It is not possible to justify in this paper all the reasons for choosing and defining each trait. 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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