CT-based selection for improving the carcass traits of growing rabbits

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ABSTRACT – The objective of the paper was to summarize the main results of selection based on data of computer tomography (CT). Pannon White growing rabbits were selected for L-value (the average of surface *of m. Longissimus dorsi* between the 2nd and 3rd , and 4th and 5th lumbar vertebrae) between 1992 and 2003. Since 2004 the selection criteria is the volume of thigh muscle. The effectiveness of both methods was proven by estimating the genetic trend, using divergent selection and comparing different breeds/lines with Pannon White rabbits. The increased performance (larger amount of meat in the carcass) of the selected animals gives an extra profit for slaughterhouses.

Key words: Growing rabbit, Selection, CT, Carcass traits.

INTRODUCTION – The main directions of rabbit selection for productivity aim to improve either the prolificacy in maternal lines or growth rate in terminal lines. Improving the carcass traits has not been among the selection goal. The advanced technology existing at the Kaposvár University provides the possibility of using computerised tomography (CT) for selecting carcass traits of growing rabbits. One of the selection criteria of Pannon White rabbits was the surface of *Longissimus dorsi* muscle (MLD) between 1992 and 2003, and the volume of thigh muscle (VTM) since 2004.
In this paper we summarise the main results of the CT based selection on carcass traits of Pannon White rabbits.

MATERIALS AND METHODS – The selection has been performed at Kaposvár University on Pannon White rabbits since 1992. The first step of the selection was based on the growth rate between 5 and 10 weeks and the rabbits showing the best weight gain were examined by CT at the age of 10.5 weeks.
In case of L-value on the topogram the anatomical points of the CT scans were marked on the junction of the 2nd and 3rd, and 4th and 5th lumbar vertebrae. L-value is the average of the surface of MLD measured on the two locations.
In case of volume of thigh muscle (VTM) 11-12 CT scans were taken every 10 mm between *crista iliaca* of *os ilium* and patella. Summing the measurements on scans the VTM was determined.

RESULTS AND CONCLUSIONS – Before beginning the selection the connection between CT based parameters and carcass traits was estimated. The closest correlations

were found between the L-value and dressing out percentage (DoP) and the ratio of mid part of the carcass (r=0.53-0.65 and 0.67-0.71, resp.) (Szendrő *et al.*, 1992).
The estimated h^2 of L-value was 0.41, the genetic correlation between L-value and DoP was 0.45 and the genetic trend was between 0.12 and 0.78 cm^2 (1.7% yearly genetic improvement) (Szendrő *et al.*, 2004).
In the divergent selection experiment only male rabbits were selected. The weight of mid part of carcass (452 and 430g, P<0.05) and the DoP (64.1 and 62.3%, P<0.05) were significantly higher in the second generation of plus selected group than that of the first generation of minus selected rabbits (Szendrő *et al.*, 1996).
Comparing crossbred Pannon White (P) rabbits with different terminal hybrid line rabbits (Hycole and Zika) the ratio of MLD to the carcass (11.2, 10.8 and 10.5%) was the highest in rabbits originated from P males (Metzger *et al.*, 1996a). Similar results were published when the genotypes of P and Hycole were compared (Metzger *et al.*, 1996b).
All of the results proved that the selection based on L-value was effective.
In 2004 the selection criteria was changed to volume of tight muscle (measured by CT).
The phenotypic correlation between VTM and weight of hind leg and DoP were 0.77 and 0.45, resp. (Nagy *et al.*, 2009). The estimated value of h^2 of VTM varied between 0.19 and 0.33 (Nagy *et al.*, 2005, 2010; Gyovai *et al.*, 2008). The selection response was $4cm^3$ per year (Gyovai *et al.*, 2008).
Comparing the second generation of divergently selected rabbits, the more selected animals reached higher values in proportion of hind leg to the carcass (38.2 and 36.3%, P<0.001), and DoP (59.8 and 57.8, P=0.086) and lower values in gastrointestinal tract (16.7 and 18.1%, P<0.05), ratio of fore part to the carcass (29.4 and 30.1%, P<0.05) and ratio of perirenal fat (1.90 and 2.40%, P<0.01) (Szendrő *et al.*, 2008).
Carcass traits of different crossing combinations using P, Maternal line (M) as dams and P, M, Large body line (L), Terminal line of Hycole (H) as sires were compared. P dams and P sires had positive effect on DoP, ratio of hind part and percentage of MLD but opposite tendencies were observed in ratio of fort part and perirenal fat (Szendrő *et al.*, 2010). In another experiment the purebred P, M and L genotypes were compared. The highest values in DoP (61.3, 60.2 and 61.1%) and ratio of hind part (38.2, 37.3 and 37.2%) but lowest values in ratio of perirenal fat (1.92, 2.16 and 1.99%), were observed in P rabbits (Szendrő *et al.*, 2009).
It has to be underlined that in the last two experiments (Szendrő *et al.*, 2009, 2010) the large type (paternal) line achieved similar DoP than P rabbits because the L line has also been selected for VTM since 2005.
All of the results proved that the CT based selection for volume of thigh muscle is effective to improve one of the most valuable parts (hind leg) of the carcass.
The CT based selection provides a high economical benefit for the slaughterhouses. According to our calculation using the data of the experiments (Metzger *et al.*, 1996a; Szendrő *et al.*, 2006, 2010) the price of different part of the carcass and similar price for purchased rabbits, the higher amount of meat in the carcass result an increase profit for the slaughterhouse. Calculating with 1 million rabbits per year the extra income is about 350,000-370,000 Euros (Mikó *et al.*, 2010).

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