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PHYSICAL CHARACTERISTICS OF THE MUSCLE *Biceps femoris* AND *Longissimus dorsi* OF MALE AND FEMALE NEW ZEALAND WHITE CROSSBREED RABBITS

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Abstract

In general muscles of male rabbit is more active than the female one, the function in each carcass also more active, suspected there is a different characteristic of muscles in each of male and female rabbit carcass. The purpose of this research is to know the physical characteristics of muscle Longissimus dorsi and Biceps femoris of New Zealand White Crossbreed Rabbit. Research using the Design Pattern of nested (nested), muscle Longissimus dorsi and Biceps femoris is nested within the sex of males and females. Data were analyzed with analysis of variance followed by Duncan's multiple range test. Variables observed were: muscle acidity (pH), the water holding capacity, and the color, i.e. the brightness (L), reddish (a) and yellowish (b). The results showed that gender has no effecy on pH, Water Holding Capacity and color of muscle of New Zealand White crossbreed rabbit. Acidity (pH), Water Holding Capacity and color of Biceps femoris and Longissimus dorsi of male rabbit had no different, similarly on female rabbit.

Key words*: rabbit, sex, muscular, physical.*

INTRODUCTION

The quality of meat is a broad term which includes the characteristics of chemical, physical and sensory. Some physical characteristics that can be measured are color, pH and water holding capacity. These characteristics are interconnected, so that the investigations needs to be conducted simultaneously to evaluate the meat quality (Hernandez et al., 1998).

Acidity (pH) of the rabbit meat after 24 hours of cutting on *Longissimus dorsi* mucle was ranged from 5.6-5.7, and bisep femoris ranged from 5.7 (Pla et al., 1998). Acidity (pH) of *Longissimus dorsi* muscle on male animal (5.64) higher than female animal, which is 5.54 (Pla et al., 1998). While the pH of *Biceps femoris* muscle is not much different, which is 5.74 in female rabbit and 5.72 in male rabbit (Yalçin et al., 2006). Result of the research of Barron et al. (2004), that the pH of *Longissimus dorsi* muscle of male rabbit is 6.3 and female rabbit is 6.1, then the pH of *Biceps femoris* of male rabbit is 6.1 and female rabbit is 6.0.

The meat color is an important visual characteristic of it first impression. The meat color varies according to carcass part, and influenced by many factors, including feed, species, race, age, sex, stress (activity level and muscle type), pH and oxygen (Bizkova and Tumova, 2010; Soeparno, 2009).

Water Binding Capacity by meat protein or Water Holding Capacity (WHC or WBC) is ability of meat to bind its water or the water which is added during external force influence, for example meat cutting, heating, grinding, and pressure on acidity (pH) is higher, from the isoelectric point of meat proteins 95.0-5.1) but below pH 7-10, has better water holding capacity and less drip (Soeparno, 2009).

MATERIALS AND METHODS

Sample used *Longissimus dorsi* (LD) and *Biceps femoris* (BF) muscle from rabbit meat which was refrigrated in 6^{o}C for 22-24 hours, age cut 12 weeks from 24 female rabbits and 24 male rabbits.

Measured variable:

Meat Acidity (pH)

Measurement of pH meat is done by using pH-meter.

a. Meat color
   Measurement of meat color is done by using tool Chromameter Minolta CR-

400. The measurements result are displayed in scale L* (brightness), a* and b* (redness and yellowness).

b. Water Holding Capacity (WHC)
Water Holding Capacity is determined by the method of Hamm (Soeparno, 2009)

$$\text{Water Holding Capacity} = \text{KA\%} - \frac{\text{mg } H_2O}{300 \text{ mg}} \text{ x } 100\% \quad (10)$$

mg H_2O: amount of free water that comes out of the meat after pressing in miligrams.
KA%: the percentage of water content.
300 mg: the number of samples of raw meat in milligrams.

Experimental Design:
The design used nested, muscle type (*Longissimus dorsi* (LD) and *Biceps femoris* (BF) nested in gender (female and male), with 4 groups of weaning weight (400-700) as replication.

RESULTS AND DISCUSSIONS

The result of the research of physical characteristic of rabbit meat (pH, water holding capacity, and color) on male and female rabbit is listed in Table 1.

Table 1. Influence of sex toward physical characteristic of meat rabbit.

Measurament Variabel	Sex	
	Male	Female
Ph	5.24 a	5.32 a
Water Holding Capacity	58.5 a	59.77 a
Colour		
A	14.56 a	13.35 a
L	62.82 a	63.26 a
B	36.04 a	37.02 a

Means for the same item in the same column with the same letter was not significantly different.

The data in Table 1 indicates that pH meat of male rabbit higher that the female. This is due to male rabbit more active than the females, so the glycogen reserves in male rabbit is lower. Decrease in pH causes the water which is associated with muscle protein is running out leaving the muscle fibers and lower water holding capacity. Water Holding Capacity will be even better if the pH value which is generated further away from the isoelectric point of meat proteins ie 5.0 to 5.1, but still below pH 7 to 10 (Soeparno, 2009).

Water Holding Capacity of meat of female rabbit is higher than the male one. This indicates that the meat of female rabbit has the ability to bind water better than the male rabbit. Brightness of the meat of male rabbit is better than the female's, but the color of redness and yellowness of female rabbit meat is higher than the male's.

Statistical analysis showed that the acidity (pH), water holding capacity and meat color of male and female rabbit was not significantly different. This is due to the treatments which was given to the rabbit before slaughtering in each treatment were the same, so the glycogen reserves in the muscle remain the same, so that in the process postmortem glycolysis produce the same ultimate pH. The same pH will cause the same water holding capacity. The color difference in male and female muscles are not significant, because the rabbit was slaughtered in young age (12 weeks). Meat with good quality must be brighness in color, red or pink but not brown, purple or greyish (Wariss, 2000).

The physical characteristics of muscles (pH, water holding capacity, dan meat color) male and female rabbit are listed in Table 2.

A decrease in pH muscle after withering largely determined by the rate of postmortem glycolysis and glycogen reserves of muscle and a normal ulimate meat pH is between 5.4-5.8 (Soeparno, 2009). pHu range (pH ultimate) in rabbits were based on the muscle's location according to Hullot and Ouhayoun (1999) ranged between 5.4-6.4. While Kowalska et al.(2011) obtained pH 24 hours after cutting the group of easily stressed rabbit by 5.22 while pH value of a group of rabbits which can cope with stress is 5.70. Value of ultimate pH (pH 24 hours after slaughtering) obtained in this study can be categorized as low, ranging from 5.22 to 5.31.

Table 2. Effect of muscle type in gender against physical characteristics of meat rabbits

Measurement Variabel	Muscle Type			
	Male		Female	
	BF	LD	BF	LD
pH	5.22 a	5.26 a	5.33 A	5.31 A
Water Holding Capacity	57.51 a	58.76 a	61.24 A	58.30 A
Colour				
A	14.75 a	14.37 a	13.21 A	13.49 A
L	62.80 a	62.69 a	64.08 A	62.08 A
B	8.87 a	9.28 a	8.45 A	8.56 A

Means for the same item in the same column with the same letter was not significantly different.
BF: *Biceps femoris*
LD: *Longissimus dorsi*

Meat color is a key determinant, because it is the only criteria that can be used by consumers to purchase meat.
The characteristic color of the meat depends on the species and type of muscle.
Color of rabbit meat can be affected indirectly by environmental factors associated with the production conditions (Dal Bosco et al., 2002), stress before slaughtering (Maria et al., 2004) and muscle activity in living animals (Dalle Zotte et al., 2009).

CONCLUSIONS

Sex had no effect on pH, water holding capacity and muscle color of breed of New Zealand White rabbits. Acidity (pH), Water Holding Capacity and color of *Biceps femoris* and *Longissimus dorsi* of rabbits male were no different, similarly on the female rabbit.

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