THE EFFECT OF RESTRICTED FEEDING AND DIFFERENT OF SLAUGHTERING AGE ON PRODUCTION OF REX RABBIT PELT

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Received April 19, 2010; Accepted May 29, 2010

ABSTRACT

The purpose of this research is to study the interaction between slaughter age and restricted feed, as well as the influence of each factor on the production of rex rabbits pelt. Randomized Block Design with Factorial was used in this experiment with the first factor was 3 levels of restricted feeding treatment where the amount of feed as follow: P_1= 100 % from the total feed requirement, P_2 = 80% from total feed requirement and P_3 = 60% from the total feed requirement. Feed was given in the amount of rabbits requirement, in which 100% of the total requirement was calculated based on body weight (6.7% of body weight in dry matter basis), and second factor was 3 levels of slaughter age (U_1= 120 d, U_2= 150 d, U_3= 180 d) and each treatment was repeated 6 times. The data were analyzed by Anova, and analyzing between the treatments used Contrast Orthogonal. The variable measured were pelt production (weight pelt, width pelt, thickness dermis and epidermis) of Rex rabbit. There was an interaction betwen slaughtered age and the amount of feed given to Rex rabbits. Feeding 80% from the total feed requirement and the slaughtered age at 150 d were the most efficient in producing pelt of Rex rabbits, with weight 261.0 ± 30.33 g, width 928.0 ± 75.5 cm^2, and epidermal thickness 32.50 ± 1.1µ, and dermis 2685.50 ± 15.0 µ.

Keywords: pelt, rex rabbit, thickness,weight, width

INTRODUCTION

In a livestock business, feed is a biggest factor in cost production (Freetly *et al.*,2001; Clark *et al., 2*000), because feed cost is almost 60-80% from all the cost production. Therefore, every livestock busines will always increase the efficiency by reducing feed cost in order to have higher profit. Reducing feed cost can be done by restriction the amount of feed. Issaack *et al.*(1960) stated that altered feeding can be applied by restricting the amount of high energy diet, limiting the amount of feed consumed, giving feed with mixed system between floured and crumbled materials, increasing fiber content on mixed diet, or limiting time of feeding. Feeding restriction can increase feed efficiency (Perrier and Ouhayoun, 1996; Tůmovà *et al.*, 2002, 2003; Dalle *et al.*, 2005). Increasing feed efficiency means decreasing cost production, however feed restriction may reduce the nutrition consumed and may affect rabbit growth and in turn will affect skin production because skin covers.

Feed restriction give an effect to the weight of regulating metabolism organs (Drouillard *et al.*, 1991; Atti *et al.*, 2000). Research on sheep showed that restricted feeding significantly decreased heart and lungs weight (Mahouachi and Atti, 2005), and had been proved that sheep in restricted feeding had a smaller liver (Ferrell *et al.*, 1986, Murray *et al.*, 1997). The change of this metabolism organs weight may affect nutritional metabolism inside the body and finally affect growth and pelt production.

The effect of restricted feeding on fat metabolism process in the body has been proved in swine which is reduced energy release and it causes meat with little fat (Lovatto *et al.*, 2006). It wa similar to restricted feeding on broiler chicken that affects the acummulation of fat under the skin (Leenstra, 1986). The acummulation of fat in the skin is affected by age and further, it will affect skin production. Two months age rabbit can not produce good quality pelt because it is thin, not

wide and less powerfull, its fur is lump up. It is different with mature rabbit which is thicker, wider, higher density of fiber, and smooth fur as well (Trautman and Febiger, 1957).

Using restricted feeding or higher fiber content in the feed and changing it for a higher level *ad libitum* feeding about one week before the first mating resulted a longer lifespan and higher productive level (Szendro, 2009). Feeding restricted could have some advantage if feed intake is reduce, rabbit are more lean, not only the fat deposit but the total lipid in the muscle is also decreased (Gondret *et al.*, 2000) . Feed has a great effect on animal performance, including the quality and quantity of pelt produced. High quality fed animals will produce thick and solid skin, thus it affects its weight.

Slaughtering age and feed restriction are two factors that affect pelt production. In mature rabbit with unrestricted feed, fat acummulation under its skin will increase, but it is not in young rabbit, because the feed is used for basic life and growth, then if the basic life is fulfilled, the excess of feed will be used for pelt growth and finally it will affect pelt production. The effect of age has a close relationship with animal's growth. The older animal has wider, heavier and thicker (Trautman and Febieger, 1957 : Blom and Fawcet, 1977).

The objective of this research was to find out the optimal slaughter age, and the most efficient feeding on Rex rabbits for good pelt production.

MATERIALS AND METHODS

Fifty five males of Rex rabbit were used in this research, with the average weaning age 30 days. The rabbit were kept in individual cage. Every cage is equipped with feeder and water. The ration was composed by yellow corn-meal, Fish-meal, rice bran, soy-bean meal, baggase, field grass, molasses, lysine, methionine, $NaCO_3$, NaCl, Premix A. The diet formula contained 16.86% protein, 13.30% crude fiber, 0.90% calcium, 0.69% phosphor and 2850 kcal/kg of Digestible Energy. The diet composition is showed in Table 1. Diet was given in the pellet form

Randomized Block Design with factorial was used in this experiment with 3 levels of restricted feeding treatments where the amount of feed as follow: P_1= 100% from the total requirement of feed, P_2 = 80% from the total feed requirement and P_3 = 60% from the total feed requirement. Feed was given in the amount of the need of rabbits, in which 100% of the total need was calculated based on body weight (6.7% of body weight in accordance with dried material of ration) and 3 levels of slaughtered age (U_1= 120 days, U_2= 150 days, U_3= 180 days) and each treatment was repeated 6 times. Then the data was analyzed by Anova and Contrast Orthogonal Test. Variable analysis were pelt production(weight pelt, width pelt, thickness dermis and epidermis). The measurement variables for pelt weight (g), was measured by weighing skin that was freshly released from the body. Width pelt (cm^2), was measured according to the method of Heugenaeur (1977), based on length (cm) x width (cm). In addition, was measured using help line which was obtaine was drawn from the left foot to rear of the right foot, after meeting point between length and help lines, it was drawn a straight horizontal line to obtain the width (Figure 1). Pelt thickness were obtained by using microscope linear. Micrometer linear was used to measure the thickness of epidermis and dermis, in which was standardized to Leitz micrometer, GMBH, Wetzlar Geteiltin.

RESULTS AND DISCUSSION

Weight and Width of Rex Rabbit's Pelt

The weight, width, epidermis and dermis Rex rabbit is shown in Table 2. Itt shows that there was an interaction between slaughter age and restricted feeding on weight, width and thickness of dermis of rex rabbit pelt, but there was no interaction on epidermis thickness. The increase of rabbit slaughter age was followed by the increase of weight and width of rex rabbit pelt. On the other side, restricted feeding resulted in decrease of weight and width of pelt of rex rabbit. This was because rabbit with restricted feed had lack of nutrition, and further it could obstruct the growth and lowered the weight in which affecting skin growth, because skin width will follow body surface and its volume. In accordance with the results of research by Yurmiati(2006a), it showed that weight and width of skin of New Zealand Rabbit had been significantly affectted by slaughter weight, so did on local Kacang goat (Yurmiati, 2006b). Perrier amd Puhayoun (1996) said that rabbit with feed restriction until 56 days had lighter weight and reduce carcass length. Then, Boverra *et al*. (2008) said that rabbit with light weight and short carcass

Table 1. Ration Treatment Formula

Ingredient	Composition
Yellow corn meal	16.00
Rice bran	20.00
Soybean meal	29.00
Fish meal	2.00
Baggase	10.70
Field Grass	18.00
Molasses	4.00
Lysine	0.10
Methionine	0.20
Total	100.00

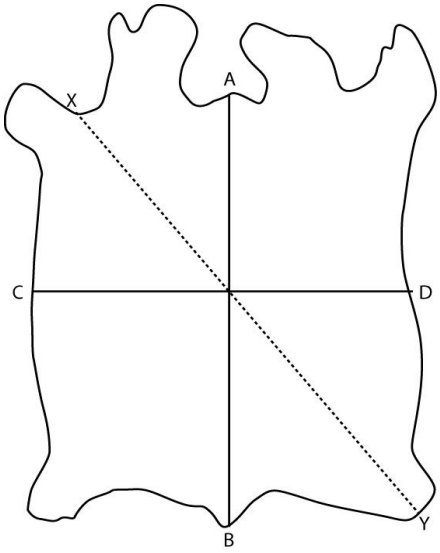

Figure 1. The method of measuring length and thickness of pelt (Hegenauer, 1972). A-B: Pelt length; C-D: Pelt width; C-Y: help line to determine the width of pelth

showed small body width. This has been proved by Mahouachi and Atti (2005) that sheep which was subjected to feed restriction showing the decrease in skin weight. The data on Table 2 shows that the highest weight of pelt was reached by rabbits fed 100% from the need of feed and at the slaughter age of 180 day while rabbits fed 60% from the need of feed had the lowest weight of pelt.

Furthermore, current research showed that giving feed 80% from total feed requirement produced weight and width of pelt in which similar to giving feed 100% from total feed requirement. This shows that giving feed 80% from the need of feed still can produce good pelt, it means rabbit still has ability to fulfill the need of the body. This is because rabbit have *coprophagi*, is eating and digesting and reabsorb nutrients from their soft feces in the night directly from their anus (Fekete and Bokori, 1985). The feces contains high protein and vitamins, so that rabbit is very efficient in utilizing their feed. In the other side, giving 60% from total feed requirement resulted in significant decrease on weight and width of pelt to became the lowest. According to Wehr *et al.* (1982), the protein need is vary depending on the physiological age of cattle, and then the protein is initialy used for basic maintenance live, growth and lactation before it is utilized for pelt. Giving feed 60% from the need of feed causes protein consumed only be enough to meet basic single life, so that its growth is less well. If that need is fulfilled, then the excess food will be used for pelt growth, because pelt has its own growth such as anagen, catagen and telogen phase. This periode is affected by animal's age and further affects production pelt (Yurmiati, 1991).

The effect of age is strongly connected with growth and development of a animal. Size and weight of animal skin is vary depend on the age. The result of this research showed that the increase of slaughtering age was followed by the increase of weight and width of pelt of Rex Rabbit. This is because, at the same given diet, the increase of age will be followed by the increase of growth in which leads to increase of weight and width of pelt. This is supported by the research of Bloom and Fawcet (1977) stated that older animal gave heavier weight and wider skin. Rabbits, those are fed by high quality diet will produce high final body weight, and will produce thicker and more solid pelt. so that resulting in higher pelt's weight. There is a positive relationship between the weight of pelt and body weight.

Thickness of Pelt of Rex Rabbit

This table showed research on pelt's thickness of dermis and epidermis which restricted feed and slaughtering age did not affect epidermis thickness, but it significantly affected dermis thickness of Rex rabbit pelt. This is because of epidermis' layer has been formed since fetus period, and the influence of feed on epidermis layer is only 18.5% (Hafez and Dyer, 1969, Yurmiati, 1991) and this epidermis's layer

Table 2. Thickness, Weight, and Width of Pelt of Rex Rabbits Resulted from Different Slaughtered Age and Restricted Feeding

Variable	Slaughtered Age (Day)			Feeding			Significance		
	120	150	180	P1	P2	P3	A	F	AF
Weight (g)	204.33±20.77	251.17±22.70	292.50±16.83	269.67±22.03	256.33±24.30	222.00±13.97	**	**	*
Widht (cm^2)	864.00±72.60	922.83±66.90	969.67±69.53	956.30±82.37	32.00±0.67	865.33±42.13	**	**	**
Thickness :									
Epidermis (μ)	32.00±0.70	35.17±0.67	36.83±0.77	34.50±0.47	32.00±0.67	37.50±0.90	ns	ns	ns
Dermis (μ)	2525.33±15.90	2909.00±13.33	3000.00±13.67	3049.00±10.1	2695.67±14.83	2689.67±17.97	**	**	**

*) differ significantly (P<0.05) ; **) differ significantly (P<0.01); ns) : not significantly different
A = slaughtered age, F = the amount of feed given, A x F = the interaction between slaughtered age and the feeding treatment, P1 = 100% from the amount of requirement, P2 = 80% from the amount of requirement, P3 = 60% from the amount of requirement

plays an important role on pelts elasticity and tenderness. As can be seen on Table 2, it showed that the highest epidermis' layer came from 180 d slaughtered age and feeding 100% of the need of feed. However, rabbits at the slaughter age of 120 d and fed with 60% of the amount need of feed had the lowest epidermis' layer. The significant interaction between slaughter age and the amount of feed given explained that the level of feed amount given to animal has an effect on dermis thickness, and this is also affected by animal's age. The older rabbits had the higher pelt thickness and higher density of dermis' layer tissues. Dermis is actual skin layer which is often called leather. In a rabbit, this is two to three times thicker than the epidermis (Thakur and Puranik, 1981). Moreover, dermis layer contains smooth muscle fibers, blood vessels and nervesas, as well as fat cells. Nutrients deficiency would slow the rate of growth of tendon and accumulation of fat between the dermis layer, as shown by research of Sukit *et al*. (1997) who showed that feed restriction affected the growth of muscle tissue and accumulation of fat in broiler. This is why the feeding treatment 80% and 60% from the amount need of feed caused the decrease of dermal thickness of pelt of rex rabbit, however those were fed by 100% from the amount need of feed in histological had little bit higher and sparse collagen fibers and reticulin. Rabbit under restricted feeding had thinner dermis' layer because they had higher density of collagen fibers and reticulin. Similar to pig that feed restriction, this reduced energy release resulting in better storage protein than fat and it will produce meat with low fat (Lovatto *et al., 2006)*.

Fat accumulation in the skin is affected by animal's age. The result of current study showed that the increase of age was followed by the increase of thickness of the dermis on pelt of Rex Rabbit. This is because the increase of age of animal will increase formation and accumulation of fat tissue. Yurmiati (1991) stated that skin lipid content increased with increasing the age. Trautman and Febiger (1957) reported that skin of adult rabbit was thicker, wider and had higher density fiber as well. The results showed that, based on the thickness of the dermis, it is recomended that the age of slaughtering at 150 days is favourable in order to produce skin with better weight, width, and dermis thickness.

CONCLUSION

There was an interaction between slaughtered age and the amount of feed given to Rex Rabbits. Feeding 80% from the amount need of feed and slaughtered age of 150 day were the most efficient in producing pelt of Rex rabbits.

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