

The Effect of Age and Slaughter Weight on Carcass of Local Female Sheep

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Abstract

The study was conducted to determine the effect of age and slaughter weight on carcass and non carcass (head, skin, legs, heart, liver, lungs and digestive tract) of local female sheep. The study was conducted on sixty local female sheep consisted thirty local female sheep with slaughter weight of 10-14.99 kg and thirty local female sheep with slaughter weight of 15-20 kg, are less than one year, 1-1.5 years, and 1.5-2 years. Data collected including age, slaughter weight, carcass weight, non carcass weight (head, skin, legs, hear, liver, lungs and digestive tract), carcass percentage and non carcass percentage. The method used was factorial pattern. The analysis shows that the slaughter weight gives very significant effect on carcass, skin, lung, liver, heart Data was analysed by analysis of variance of factorial pattern. The statistic result showed that slaughter weight significantly ($P < 0.05$) affected carcass and non carcass percentage. Age significantly ($P < 0.05$) affected carcass percentage, skin percentage, lung percentage, heart percentage, liver percentage, lungs percentage and digestive tract percentage. In this study it can be concluded that there is a significant effect between the slaughter weight to carcass and non carcass percentage, except head percentage. There is no connection between age and slaughter weight on carcass and non carcass percentage of local female sheep. Therefore it could be concluded that slaughter weight significantly affects carcass and non carcass, and in particular, age significantly affected carcass and non carcass percentage, except head percentage. There was no interaction between age and slaughter weight on the carcass percentage.

Key words : Age; Carcass percentage and non carcass percentage, local female sheep; Slaughter weight

Introduction

Sheep cattle is a potential meat commodity. The production ability of sheep is relatively fast in producing big ruminants, due to their ability to breed 3 times in 2 years and each time they can produce 2 – 3 lambs. In rural areas, many families raise sheep as their saving that can be cashed out anytime they need to. Farmers, when they have no urgent situations that will make them need some cash, usually prefer to sell their male cattle when Eid Al Adha approaches, that there are less male sheep for sale on regular days. The high price of male cattle due to its scarcity make the slaughterer choose to slaughter the female sheep that are usually relatively less expensive.

The activity of selling and buying sheep, both in markets or farmers generally use weight to measure the carcass and meat production. The calculation of carcass or meat

production is only based on experience that the accuracy is doubted. Carcass is remains of a livestock after removal of blood, head, feet, and internal organs such as heart, liver, lungs, spleen, digestion tract and reproduction tract (Soeparno, 2005). Remains of butchery of a livestock that does not count as carcass is called non carcass (Offal). Non carcass consists of edible offal and non edible offal. Edible offal consists of head (brain, tongue, and head muscles), blood, trachea, lungs, liver, spleen, heart, pancreas, skin, and feet and also digestion tract. Non edible offal consists of horn, nail and bones (Soeparno, 2005). Carcass is the main product of butchery that has a high economy value, while non carcass brings an additional income.

Slaughter weight and age affect carcass weight. A high slaughter weight will produce a high carcass percentage as well. And most sheep that are slaughtered in Slaughter House are mostly female sheep. This is in line with data collected from *Dinas Peternakan Kabupaten Bantul*, that there are 6,378 female sheep slaughter and there are only 2,063 of smaller male sheep slaughter. Many slaughterers in Slaughter House choose female sheep because they are relatively less expensive than male sheep, that way they will make more profit than slaughtering male sheep. From these facts, a study needs to be conducted to find out the effect of age and slaughter weight on production of carcass and non carcass of female sheep

Materials and Methods

This study used 60 local female sheep that are butchered in a Slaughter House owned by Bapak Mentik Kresen, Bantul, Yogyakarta in March 2007. These local female sheep were from DIY animal market. Numbered anklets made from plastic were used to identify the livestock. A scale with 0.1 kg sensitivity with maximum capacity of 120 kg was used to weigh the slaughter weight to make the weighing process easy. A Shinanno brand scale with the capacity of 6 kg with 0.01 kg sensitivity was used to weigh carcass, skin, and head. A Lion Star table scale with the capacity of 2 kg and sensitivity of 0.01 kg was used to weigh the heart, liver, lungs, and digestion tract. A knife was used to butcher female sheep

Before the study started, a pre study was conducted. A pre study was conducted one week to calibrate tools and find the precise method to take samples. Data was collected during the slaughtering that takes place between 04:00 – 07:30 in the morning. Before butchered, local female sheep was categorized according to slaughter age, judging from the replacement of baby tooth to permanent tooth (less than 1.5 years of age, 1-1.5 years of age, and 1.5 -2 years of age). Local female sheep are weighed to find out its slaughter age to then be categorized according to the slaughter weight I (10 – 14.90 kg), and slaughter age II (15 – 20 kg) with anklets attached to them as an identification tool. A butchered sheep would be skinned with its feet hang upside down, skin cut on ankles, and feet skin skinned across from anus to right ankle that the skin would be open, and then the skin will be pulled from bottom until all skin was removed. A skinned sheep were removed from head and all internal organs, and all four feet were weighed to determine the carcass weight. Liver, lungs, heart, skin, and head were weighed to determine the non carcass weight. Data observed in this study were age, slaughter weight, carcass weight, and non carcass weight that cover head, feet, liver, heart, lungs, and digestive tract Data was analyzed using Completely Randomized

Variance (RAL) with factorial pattern, with factorial pattern weight groups and 3 age groups were analyzed. If there was any difference, it was tested using Duncan Test.

Results and Discussion

Carcass weight

The average of carcass percentage from each group of local female sheep can be seen in Table 1 below

Table 1. Average carcass weight of local female sheep (%)

Slaughter weight	Age (Year)			Average
	<1	1-1,5	1.5-2	
I	34.71	38.09	45.89	39.56 ^a
II	40.29	43.25	47.98	43.84 ^b
Average	38.10 ^a	40.67 ^b	46.94 ^c	

^{a,b,c} Different superscripts on rows or columns show significant difference (P<0,05)

Slaughter weight I = 10-14,90 kg

Slaughter weight II = 15-20 kg

Analysis result on Table 1 shows that slaughter weight affects and gives very significant difference on carcass percentage. Carcass percentage in slaughter weight of group I is different and significant compared to slaughter weight in group II. This is in line with Soeparno (2005) that states that body composition is closely related to weight that affects carcass composition. This is caused by proportions of bones, muscles, and fat as carcass main components

This study result supports the previous study that age affects weight and percentage of carcass (Razi, 2004). The average carcass percentage of 1.5 – 2 years old sheep is higher than carcass percentage of 1 year to 1.5 year old sheep. The average of carcass percentage of less than a year old sheep to 1.5 – 2 year old sheep is different nor significant. This might be due by several factors and they are growth, maintenance and environment. According to Williamson and Payne (1993), macro environment will affect the feed supply and other than that, Indonesia with its wet tropical climate is a good place for external and internal parasites to grow that often infect livestock, although these parasites are not deadly but they can affect livestock productivity. Feed quality and quantity will affect the growth and development of livestock. There is no interaction between age and slaughter weight on carcass percentage.

Non carcass percentage

Non carcass in this sense covers head, skin, feet, heart, liver, lungs, and digestive tract. Non carcass percentage is a comparison between non carcass weight and slaughter weight in percentage.

Head percentage

The analysis result of head percentage from each locale female sheep group can be seen on Table 2 below

Table 2. Average head percentage (%) of local female sheep

Slaughter weight	Age (Year)			Average
	<1	1-1,5	1,5-2	
I	8.73	8.38	8.04	8.38 ^a
II	7.11	6.71	6.51	6.77 ^b
Average ^{ns}	7.92	7.54	7.27	

^{a,b,c} Superscripts that are different on lines or columns show significant difference.

($P < 0,05$)

^{ns} non significant

Slaughter I = 10-14,90 kg

Slaughter weight II = 15-20 kg

On Table 2 it can be seen that slaughter weight has significant effect than head percentage. The head percentage of local female sheep in slaughter weight I is higher than The head percentage of local female sheep in slaughter weight II. This proves that the higher the slaughter weight of a sheep, it will reduce the head weight percentage. Nutrition treatment and pastura species or feed on sheep livestock does not affect weight of head, feet, and skin of sheep with the same weight (Soeparno, 2005). Age does not give significant effect on head percentage of local female sheep. This might be due to the growth of the local female sheep itself. There is no interaction between slaughter weight and age on head percentage, and if one factor does not give significant effect, then there can not be any interaction occurs between them.

Skin percentage

Skin is a part that can not be separated from a livestock slaughter. Skin is a non carcass component that has a high economy value. The average analysis result of skin percentage from each group of local female sheep can be seen in Table 3 below ..

Tabel 3. Average skin percentage (%) of local female sheep

Slaughter weight	Age (Year)			Average
	<1	1-1.5	1.5-2	
I	11.36	10.98	10.27	10.87 ^a
II	10.13	9.38	8.10	9.20 ^b
Average	7.92 ^a	7.54 ^{ab}	7.27 ^b	

^{a,b} Superscripts that are different in each line or columns show significant difference

($P < 0,05$)

Slaughter weight I = 10-14,90 kg

Slaughter weight II = 15-20 kg

Analysis result in Table 3 shows that slaughter weight has significant effect on skin percentage. This is due to weight gain that will lower skin percentage because an

animal growth has its levels. Each level is divided by; the first one that grows rapidly is bones, followed by muscle network, and the last one is fat growth.

Analysis result on Table 3 shows that age gives significant effect ($P > 0.05$) on skin percentage. Skin percentage of less than a year old sheep is different significant than skin percentage of 1.5-2 year old sheep. Skin percentage of 1-1.5 year old sheep is not significant different than the skin percentage of less than a year old sheep. The result of the study is supported by previous study conducted by Suliatio (2004) that states that skin percentage of less than a year old sheep is $8.35 \pm 1.53\%$ and skin percentage of less than a year old sheep is $8.42 \pm 1.67\%$. There is no interaction between slaughter weight and age on skin percentage is not significant different

Feet percentage

Feet is part of non carcass that is very important. Average of feet percentage from each group of local female sheep can be seen in Table 4.

Table 4. Average feet percentage (%) of local female sheep

Slaughter weight	Age (Year)			Average
	<1	1-1,5	1,5-2	
I	3,65	3,50	3,25	3,47 ^a
II	2,78	2,66	2,44	2,63 ^b
Average	3,21 ^a	3,08 ^{ab}	2,85 ^b	

^{a,b}. Superscripts that are different on lines or columns show significant difference ($P < 0,05$)

Slaughter weight I = 10-14,90 kg

Slaughter weight II = 15-20 kg

Slaughter weight gives a very significant difference on feet percentage. Feet percentage in slaughter weight I is almost the same as feet percentage in slaughter weight II. This is due to young livestock that may still grow. Nutrition also affects non carcass percentage that will increase following a living livestock weight

Age gives a very significant difference on feet percentage. Feet percentage in less than a year old livestock has a significant difference than feet percentage in 1.5 – 2 year old livestock. This is due to the fact that in that age, sheep can still grow in network growth mass and bones. The analysis result states that there is no interaction between slaughter weight and age on feet percentage.

Heart percentage

Heart is a vital organ for a livestock. The average heart percentage from each local female sheep can be seen on Table 5.

Analysis result on Table 5 shows that slaughter weight gives a significant difference on heart percentage, This is due to growths of organs such as heart, liver, and lungs is in line with weight gain.

Analysis result in Table 5 shows that ages has significant effect on heart percentage. Lungs percentage of less than a year old livestock is 0.72 while according to Sen (2004), lungs weight of less than a year old livestock is 0.41 – 0.03. This difference is caused by different environment condition and livestock feed. Lungs percentage of a less than a year old livestock does have significant difference than 1.5 – 2 years old

livestock. This is caused by nutritional treatment especially pasture species that has different effect on internal non carcass weight such as liver, heart, lungs, and kidney (Soeparno, 2005). The analysis result states that there no interaction between slaughter weight and age on heart percentage.

Table 5. Average of heart percentage (%) of local female livestock

Slaughter weight	Age (Year)			Average
	<1	1-1,5	1,5-2	
I	0,85	0,70	0,70	0,75 ^a
II	0,60	0,52	0,50	0,54 ^b
Average	0,72 ^a	0,61 ^{ab}	0,60 ^b	

^{a,b}Superscripts that are different on lines or columns show significant difference

(P<0,05)

Slaughter weight I = 10-14.90 kg

Slaughter weight II = 15-20 kg

Liver percentage

Average liver percentage analysis result of each local female sheep can be seen on Table 6.

Table 6. Average liver percentage (%) of local female sheep

Slaughter weight	Age (Year)			Average
	<1	1-1.5	1.5-2	
I	2.81	2.43	1.96	2.40 ^a
II	2.11	1.97	1.82	1.96 ^b
Average	0.72 ^a	0.61 ^a	0.60 ^b	

^{a,b}Superscripts that are different on lines or columns show significant difference

(P<0,05)

Slaughter weight I = 10-14.90 kg

Slaughter weight II = 15-20 kg

From Table 6 it can be seen that slaughter weight has a very significant effect on liver percentage. Sheep that are fed a high energy feed will have their organs such as liver, kidney, and skin that weigh more than sheep that are fed low energy feed. This condition is also due to the level of sheep maintenance system.

From table 6 it can be seen that age has significant effect (P<0.05) on liver percentage of local female sheep. Liver percentage of less than a year old sheep has significant difference to 1.5 year – 2 year old sheep while the liver percentage of 1 to 1.5 year old sheep shows no difference to less than a year old sheep and liver percentage of a year to 1.5 year old sheep has no significant difference to 1.5 to 2 year old sheep, then it can be stated that the percentage of non carcass part such as skin, blood, stomach, small intestines and liver decreases. A young sheep has all these parts compared to older and bigger livestock according to Forrest et al (1975) as cited by

Soeparno (2005). Liver percentage of less than a year sheep is 2.46 and is different from Sen (2004) who argues that liver percentage of less than a year old sheep is $1.19 + 0.21$. This is caused by different breed of sheep and environment condition. The analysis result states that there is no interaction between slaughter weight and age on liver percentage. This is due to average liver percentage of less than a year old sheep has no significant difference to liver percentage of 1-1.5 year old sheep.

Lungs percentage

Analysis result of average lungs percentage from each local female sheep groups can be seen on Table 7

Table 7. Average lungs percentage (%) of local female sheep

Slaughter weight	Age (Year)			Average
	<1	1-1.5	1.5-2	
I	2.33	2.11	1.60	2.01 ^a
II	1.62	1.58	1.46	1.55 ^b
Average	1.98 ^a	1.84 ^a	1.53 ^b	

^{a,b}Superscripts that are different on lines or columns show significant difference (P<0,05)

Slaughter weight I = 10-14.90 kg

Slaughter weight II = 15-20 kg

Slaughter weight has a significant effect on lungs percentage. This analysis result is supported by Soeparno (2005) who argues that in general, the relative growth coefficient of non carcass weight is affected by sex, nutrition, age and slaughter weight. This argument is also supported by Basuki et al (1998) that states that factors that affect livestock growth speed are genetics, sex, age, feed, and physiology environment (temperature, humidity, and climate)

From analysis result from Table 7, it can be concluded that age has a significant effect (P<0.05) on lungs percentage in local female sheep. The liver percentage of a less than a year old sheep has a significant difference to a 1.5 – 2 year old sheep while the liver percentage of 1 – 1.5 year old sheep is no different to the liver percentage of a less than a year old sheep and liver percentage of 1.5 – 2 year old sheep shows no difference to the liver percentage of 1.5 – 2 year old sheep. This is due to nutritional treatment including pasture species has different effect on internal non carcass weight such as liver, heart, lungs, and kidney (Soeparno, 2005). There is no interaction between slaughter weight and age on liver percentage. .

Digestive Tract Percentage

The main components of sheeps digestive tract are :rumen, reticulum, omasum, small intestinen and large intestine. Analysis result of average digestive tract percentage from each group of local female sheep can be seen on Table 8.

Analysis result on Table 8 shows that digestive tract percentage is affected by a sheep slaughter weight, This is due to digestive organs and metabolism organs do not show a great increase in weight as in line with nutritional and physiological status of the livestock. According to Attwood (2007), digestive tract percentage of a sheep weighs

between 10 – 14.99 kg is 14.71 while according to this research, it is 12.2 kg. The difference of the study results can be caused by the difference in raising the sheep.

The study result from Table 8 states that age has significant effect on digestive tract percentage. The digestive tract percentage of less than a year old has significant difference to 1.5 to 2 year old livestock while the digestive tract percentage of a year old to 1.5 year old livestock has no significant difference to less than a year old and 1.5 to 2 year old livestock. This is due to different nutritions in feed that result in the speed of growth of the livestock

The study result on Table 8 states that there is no interaction between slaughter age and age on digestive tract percentage. This is due to average percentage of 1 – 1.5 year old livestock is almost the same as the percentage of less than a year old and 1.5 – 2 year old old livestock.

Table 8. Average digestive tract percentage (%) of local female sheep

Slaughter age	Age (Year)			Average
	<1	1-1.5	1.5-2	
I	10.23	9.41	8.91	9.52 ^a
II	8.59	7.87	7.57	8.01 ^b
Average	9.41 ^a	8.64 ^{ab}	8.24 ^b	

^{a,b}Superscripts that are different on lines or columns show significant difference (P<0,05)

Slaughter weight I = 10-14.90 kg

Slaughter weight II = 15-20 kg

Conclusion

Based on this study result it can concluded that an increase in age and slaughter weight will increase the carcass and non carcass percentage. There is no interaction between slaughter age and age on carcass and non carcass percentage (head, skin, feet, heart, liver, lungs, and digestive tract)

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