Indonesian Journal of Agricultural Research Vol. 05, No. 02, 2022 | 121 – 131

talenta PUBLISHER

I n J A R

Indonesian Journal of Agricultural Research

Growth and Development of Chicken Carcass in Different Sex and Age

Harapin Hafid

Faculty of Animal Science, Halu Oleo University, Indonesia

Abstract. This study was aimed to determine the growth and development of Broiler chicken carcass and components at different sex and age . The method used in this study is the Huxley Y = a x b allometric equation which is transformed into a logarithm equation Log Y = Log a + b Log X. This research was conducted in the Cage of the Animal Production Department of the Faculty of Agriculture, Halu Oleo University. The parameters observed in this study were the carcass and carcass parts. Based on the results of the study showed that the growth coefficient of male and female broiler carcasses were not significantly different (P>0.05) which meant that they had a time of early development when compared to the growth of parts of the body as a whole. The growth and development patterns of the carcasses of both male and female broiler chickens at the age of 0 - 5 weeks is relatively the same.

Keywords: age, carcass, chicken, growth and development, sex

Received 20 October 2021 | Revised 28 January 2023 | Accepted 8 February 2023

1. Introduction

Livestock as a producer of high protein products has a big contribution both in terms of the country's economy and in the fulfillment of the nutrition of the people in Indonesia. Along with increasing public awareness of the importance of fulfilling good nutrition has also led to an increase in demand for meat. Based on data from the Director General of Agriculture and Animal Health daily consumption of protein per capita for meat in 2016 was 4.20 grams, an increase of 25.37 percent compared to 2016 consumption of 3.35 grams. From these data it is clear that the livestock sub-sector has the best potential to be developed in terms of providing animal products such as beef, chicken, eggs, milk and others [1].

Poultry, especially chicken, was a source of animal protein which is very popular in Indonesia. Indonesian people were already familiar with broiler chicken meat because it has a relatively affordable price and can be easily searched on the market [2]. This can be seen from the consumption of broilers/broilers per year which has increased every year where in 2013 as many as 3,650 kg increased to 5,863 kg in 2018 [1].

*Corresponding author at: Faculty of Animal Science, Halu Oleo University, Jl. HEA Mokodompit UHO Campus Anduonohu, Kendari 93232, South East Sulawesi, Indonesia

E-mail address: harapin.hafid@uho.ac.id

p-ISSN: 2622-7681 | e-ISSN: 2615-5842 | DOI 10.32734/injar.v5i2.7425
Journal Homepage: https://talenta.usu.ac.id/InJAR

Broiler chicken farm production is currently growing very rapidly along with the increasing market demand for broilers [3]. The activity has great potential to be developed, so that it can meet the needs of the broiler meat market, improve the welfare of households and families, create jobs. In addition, the surrounding community will be encouraged to try broilers with a partnership pattern because it has certainty in the aspect of marketing the results [4]. Broiler chicken is a chicken that was developed to produce meat quickly. Broiler is a poultry that has a very fast growth rate with a target harvest of less than 5 weeks with a body weight of about 1.7 kg / head. The superiority of broilers comes from the very strict selection process so that superior genetic traits are obtained with controlled maintenance conditions including food, ambient temperature, and maintenance management [5-7]. Therefore it is not surprising that many people are starting to work in the chicken carcass business.

Poultry carcasses, especially chicken, are the most widely traded form of commodity. Chicken carcasses are products of the cutting process, produced after going through the stages of ante mortem inspection, slaughtering, blood finishing, brewing, hair removal and dressing (leg cutting, viscera removal, and washing). Chicken carcass is an overall form of chicken without feathers, head, legs and viscera [8]. Carcass is the main product of beef cattle and has a complete nutritional value to support human life, so many researchers are focusing attention to increase carcass productivity both on-farm and off-farm resistance. The percentage of carcasses is influenced by cutting age. The longer the cutting age, the greater the percentage of carcasses because the carcass part is part of which is included in production, so that it grows larger in line with age [9-12]. The results of the percentage of carcasses varied in various studies because it was influenced by various factors including genetic differences, maintenance management, rations, chicken age and others. Besides that, sex affects broiler chicken carcass. Male chickens tend to have a higher life weight, carcass weight, chest and leg weights than females [11,13-14]. Based on this background, this study was conducted to evaluate the growth and development of broiler carcass parts in different sexes and age level.

2. Materials and Methods

This study used broiler chickens with various ages (1, 7, 14, 21, 28 and 35 days). The study was designed using broiler chickens that are kept in a cage plot with a base litter. The enclosure plot used two plots with each enclosure measuring 3 meters long, 2 meters wide and 1 meter high (approximate male and female ratio of 50:50). Before maintenance is carried out, the cage and equipment were disinfected using disinfectants. After the DOC arrived, was given water mixed with sugar (rather sweet) to restore the chicken's condition, then after ten hours the chickens were given vita stres. During the maintenance, mixed water with vita chick was given on ad libitum as well as feed. To prevent ND chicks were given Medivac ND Hitchner B1 vaccine, through eye drops in chicks. Placement of chickens in cage plots was random, after through sexing prosed

based on cloaca. Separation between male and female livestock, each estimated at 50 head kept for 35 days, for data collection of carcasses growth and development performed serial slaughter of chickens at ages 1, 7, 14, 21, 28, and 35 days, so we get a point plot (point plot) which will then be analyzed. Each plot point consists of 6 heads (3 males and 3 females) which are slaughtered and broken down into carcasses and carcass components. The total number of chickens slaughtered was 36 chickens.

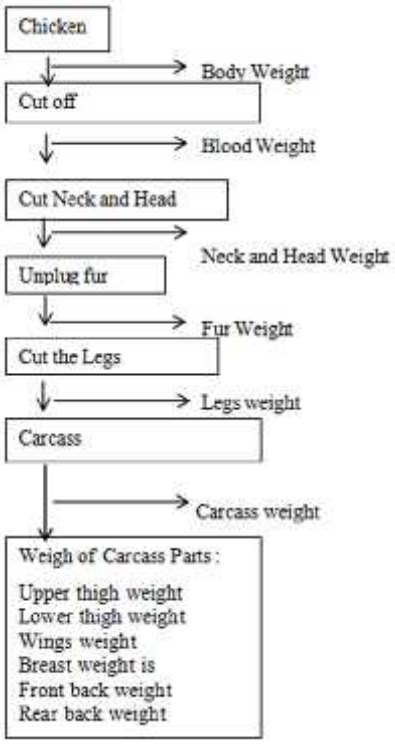

Figure 1. Chicken slaughtered process [7]

The parameters observed in this study were:

1. Cut weight is the weight of the chicken before it is cut after it has been fasted for about 12 hours (body weight).
2. Empty cut weight is the cut weight reduced by the contents of the digestive tract and blood (empty body weight).
3. Upper thigh weight is the weight of the proximal thigh after being separated from the distal thigh right in the joints of the femur and tibia fibula (thight).
4. Lower thigh weight is the weight of the distal thigh after being separated from the thigh of the proximal right in the joints of the tibia fibula and femur (drumstick)
5. Wing weight is obtained by removing the two wings on hinges attached to the shoulders and then weighing them.
6. Breast weight is whole breast weight (chicken breast)
7. Front back weight is the back weight of the anterior part after being separated from the posterior part right at the junction of the Thoracalis bone and the lumbo sacral bone
8. Rear back weight is the weight of the back of the pasterior part after being separated from the anterior part right at the junction of the sacral bone with the thoracic bone

Regression analysis is a statistical method used in research. In regression analysis, the relationship between one or more independent variables (independent) X and a response variable (dependent) Y is examined. A simple linear regression model is used. namely:

$$Y = a + bX_i \quad (1)$$

Where: Yi = dependent variable observation i; Xi = independent variable observation i; a = the intercept; b = slope; i = 1, 2, 3, . . ., N.

3. Results and Discussion

3.1. Growth and Development of Carcass

Growth and development of carcasses of broiler chickens in different sexes and age levels can be seen in Table 1.

Table 1. Growth and Development Coefficient of Broiler Carcass and Wing on Different Sex and Age

Log Y	Sex	Age	Intersep (a)	Growth Coefficient		Value (b)	Value (r)
				B	Sb		
Carcass Weight	Male	0	-0,89	0.77	0.006	b<1	1
		1	-1,12	0.89	0.003	b<1	1
		2	-0,001	0.91	0.002	b<1	1
		3	-0,003	0.92	0.004	b<1	1
		4	-0,001	0.93	0.003	b<1	1
		5	-0,007	0.93	0.003	b<1	1
	Female	0	0.0003	0.78	0.01	b<1	0.99
		1	-0.0002	0.88	0.01	b<1	0.99
		2	0.0001	0.92	0.004	b<1	1
		3	0.0001	0.92	0.001	b<1	1
		4	-0.0001	0.93	0.002	b<1	1
		5	-0.0001	0.93	0.001	b<1	1

According to Table 1, it can be seen that the growth and development coefficient of carcass weight for both male and female aged 0-5 weeks does not show any significant difference, which is smaller than one ($b < 1$) at 95% confidence level ($p < 0.05$). This shows that the broiler chicken carcass has an early ripe nature with body weight. The value of r which is equal to or equal to one indicates a relationship between carcass and body weight or can be interpreted as the growth of broiler carcass growth is the same or close to sam with overall body growth. According to Pandiangan, Pahlevi and Hafid, life weight and carcass weight factors are very important, in addition to the weights of other organs that also have economic values [9-11,15]. Every increase in body weight will have a positive impact on carcass weight and weight of other organs produced by a livestock.

If judging more closely, it will be found differences in the value of r between male and female cattle. Where in male cattle the value of r is equal to one since the beginning of maintenance, while for new female cattle starting at the age of maintenance 3 (three) weeks. This shows that the carcass growth rate of male cattle is faster or starts earlier than female cattle. The cut weight

of male chickens is greater than that of female chickens [16]. This is caused by sexual dimorphism. Rooster has the hormone testosterone. In the growth period, the hormone synergizes with growth hormone to influence the growth of chickens, so that roosters grow faster. This causes male cattle to have a live weight, carcass weight, chest weight, weight and percentage of legs and wings and back weight [17].

Growth coefficient value (b) seen an increase with increasing age and this happens for male and female cattle. This shows that young cattle have a slightly lower growth coefficient compared to older cattle. This is in line with the statement of Walita et al which explains that body weight is affected by the age at which older animals will achieve heavier carcass weights than younger ones [18]. Furthermore Zajulie et al states that the age difference of each individual animal, where the weight of cattle slaughter at a young age is smaller than the weight of cattle slaughter at adulthood [19]. The result of lower meat weight in young cattle is due to the body size of young cattle is not yet optimal and still experiencing growth that is the division of cells to a certain body weight which then undergoes differentiation at a certain age (adult sex), known as development. However, Karno explains that the influence of sex on all types of animals sometimes takes quickly, slowly and even stopped long before the animal reaches a large size because it can be influenced by genetic or environmental factors [20]. Given these factors the achievement of lines on the influence of sex does not always match the chronological age in some animals.

3.2. Growth and Development of Carcass Components

Data on growth and development of broiler carcass components at different ages and sexes can be seen in Table 2 and 3. Based on Tables 2 and 3 it appears that the growth and growth coefficient of carcass organs in both males and females at 0 - 5 weeks, does not show any significant difference that is smaller than one ($b < 1$) at the 95% confidence level ($p < 0.05$). This shows that all carcass organs both male and female have the nature of fast cooking / early cooking with body weight. Cutting weight is generally more influential on the composition of carcass pieces than sex [21].

Table 2. Growth and Development Coefficient of Broiler of Wing, Thigh, Breast and Back on Different Sex and Age

Log Y	Sex	Age	Intersep	Growth Coefficient		Value	Value
			(a)	B	Sb	(b)	(r)
Wing	Male	0	-0.00020	0.1248	0.0116	b<1	0.9957
		1	-0.00008	0.5046	0.0074	b<1	0.9999
		2	0.00005	0.5886	0.0043	b<1	1.0000
		3	0.00000	0.6260	0.0031	b<1	1.0000
		4	0.00000	0.6498	0.0063	b<1	1.0000
		5	-0.00004	0.6648	0.0031	b<1	1.0000
	Female	0	-0.000701	0.1597	0.0201	b<1	0.9922
		1	-0.000106	0.4842	0.0075	b<1	0.9999
		2	-0.000009	0.5795	0.0040	b<1	1.0000
		3	0.000044	0.6265	0.0035	b<1	1.0000
		4	0.000010	0.6493	0.0028	b<1	1.0000
		5	0.000010	0.6625	0.0005	b<1	1.0000

Table 2. Continued

Log Y	Sex	Age	Intersep (a)	Growth Coefficient		Value (b)	Value (r)
				B	Sb		
Upper Thigh	Male	0	-0.00015	0.5084	0.0084	b<1	0.9999
		1	0.00001	0.5516	0.0058	b<1	0.9999
		2	-0.00003	0.6371	0.0071	b<1	0.9999
		3	-0.00001	0.6924	0.0080	b<1	0.9999
		4	-0.00001	0.7120	0.0030	b<1	1.0000
		5	0.00018	0.7138	0.0093	b<1	0.9999
	Female	0	-0.000204	0.5218	0.0058	b<1	0.9999
		1	-0.000028	0.5488	0.0046	b<1	1.0000
		2	0.000008	0.6362	0.0017	b<1	1.0000
		3	-0.000099	0.6698	0.0086	b<1	0.9999
		4	0.000007	0.6910	0.0028	b<1	1.0000
		5	0.000004	0.7156	0.0017	b<1	1.0000
Lower Thigh	Male	0	0.00001	0.0000	0.0012	b<1	0.0012
		1	-0.00012	0.5483	0.0116	b<1	0.9998
		2	-0.00002	0.6145	0.0066	b<1	0.9999
		3	0.00002	0.6542	0.0029	b<1	1.0000
		4	-0.00001	0.6782	0.0042	b<1	1.0000
		5	-0.00008	0.6843	0.0147	b<1	0.9998
	Female	0	0.000008	0.0000	0.0011	b<1	0.0011
		1	-0.000412	0.5323	0.0161	b<1	0.9995
		2	-0.000045	0.6117	0.0061	b<1	1.0000
		3	-0.000061	0.6494	0.0049	b<1	1.0000
		4	0.000077	0.6801	0.0185	b<1	0.9996
		5	-0.000033	0.6811	0.0047	b<1	1.0000

Gender had no effect on the percentage of edible carcasses such as meat and skin. When the rate of bone growth begins to decrease, the rate of muscle growth and fat deposition increase. This causes the meat and skin parts have not seen a significant percentage difference in broiler chickens that are cut at the age of 30 days. Furthermore, it can be seen that the growth coefficient (b) and the correlation coefficient (r) continue to increase with age, and the magnitude is no difference between male and female cattle. Found that the age at the time of cutting significantly affected the weight of the cut, the percentage of carcasses, the weight and the percentage of the breast. Besides cutting age affects the quality of most carcass parts that have high economic value [22].

Table 3. Growth and Development Coefficient of Broiler of Breast and Back on Different Sex and Age

Log Y	Sex	Age	Intersep (a)	Growth Coefficient		Value (b)	Value (r)
				B	Sb		
Front Breast	Male	0	-0.00056	0.1064	0.0321	b<1	0.9574
		1	-0.00011	0.3526	0.0134	b<1	0.9993
		2	0.00003	0.4907	0.0087	b<1	0.9998
		3	-0.00006	0.5396	0.0093	b<1	0.9998
		4	0.00000	0.5818	0.0017	b<1	1.0000
		5	-0.00005	0.5895	0.0101	b<1	0.9999
	Female	0	-0.000262	0.1706	0.0076	b<1	0.9990
		1	-0.000831	0.3393	0.0337	b<1	0.9951
		2	-0.000050	0.4831	0.0040	b<1	1.0000
		3	0.000048	0.5118	0.0110	b<1	0.9998
		4	-0.000062	0.5660	0.0132	b<1	0.9997
		5	-0.000112	0.5815	0.0049	b<1	1.0000
Rear Breast	Male	0	0.00009	0.2363	0.0051	b<1	0.9998
		1	0.00001	0.5180	0.0079	b<1	0.9999
		2	-0.00011	0.5941	0.0097	b<1	0.9999
		3	0.00001	0.6408	0.0015	b<1	1.0000
		4	0.00000	0.6570	0.0054	b<1	1.0000

Table 3. Continued

Rear Breast	Male	5	-0.00007	0.6741	0.0096	b<1	0.9999
	Female	0	0.000538	0.2670	0.0155	b<1	0.9983
		1	-0.000398	0.4955	0.0194	b<1	0.9992
		2	0.000067	0.5882	0.0053	b<1	1.0000
		3	0.000062	0.6181	0.0051	b<1	1.0000
		4	0.000008	0.6546	0.0019	b<1	1.0000
		5	-0.000057	0.6656	0.0024	b<1	1.0000
Back	Male	0	-0.00077	0.2109	0.0438	b<1	0.9791
		1	-0.00006	0.6257	0.0057	b<1	1.0000
		2	-0.00011	0.7191	0.0105	b<1	0.9999
		3	-0.00007	0.7710	0.0089	b<1	0.9999
		4	-0.00001	0.8003	0.0055	b<1	1.0000
		5	0.00009	0.8015	0.0044	b<1	1.0000
	Female	0	0.000307	0.2233	0.0088	b<1	0.9992
		1	-0.000819	0.5822	0.0322	b<1	0.9985
		2	0.000140	0.7225	0.0144	b<1	0.9998
		3	0.000070	0.7680	0.0055	b<1	1.0000
		4	-0.000048	0.7865	0.0106	b<1	0.9999
		5	-0.000072	0.8049	0.0038	b<1	1.0000

3.3. Logarithmic Regression Equation for Growth and Development of Carcass and Carcass Components

Based on Table 4, it appears that overall the logarithmic regression equation of carcass and its parts (variable Y) shows a close relationship (r) with body weight (variable X), each of which ranges from 0.99 - 1. This shows that the growth of the organ broiler chicken carcass organs are the same or close to the same as overall body weight gain. This is due to the importance of the carcass organs in supporting the life of the chicken concerned, so that the body will automatically spur the growth of these organs in order to support its life activities. The growth of a livestock is a collection of the growth of parts of each component that can be seen from the physical appearance and weight of his life [23]. Based on this relative growth, each weight gain contains a different proportion of organs and tissues. The components of the body will cumulatively increase in weight following the body's development during the process of growth until reaching adulthood as well as the development of various tissues have different speed of development [24; 25].

Table 4. Logarithmic Regression Equation for Growth of Carcass of Broiler Chicken at Different Sex and Age

Log Y	Log X	Sex	Age	Logarithmic Regression Model	Value (r)
Carcass Weight (CW)	Body Weight (BW)	Male	0	Log BK -0.89 + 0.78 Log BB	1.0000
			1	Log BK -1.12 + 0.89 Log BB	1.0000
			2	Log BK -0.01 + 0.91 Log BB	1.0000
			3	Log BK -0.01 + 0.92 Log BB	1.0000
			4	Log BK -0.01 + 0.93 Log BB	1.0000
			5	Log BK 0.01 + 0.93 Log BB	1.0000
		Female	0	Log BK 0.03 + 0.78 Log BB	0.9999
			1	Log BK -0.02 + 0.88 Log BB	0.9999
			2	Log BK 0.01 + 0.92 Log BB	1.0000
			3	Log BK 0.01 + 0.92 Log BB	1.0000
			4	Log BK -0.01 + 0.92 Log BB	1.0000
			5	Log BK -0.01 + 0.93 Log BB	1.0000

Table 5. Logarithmic Regression Equation for Growth of Carcass Components of Broiler Chicken at Different Sex and Age

Log Y	Log X	Sex	Age	Logarithmic Regression Model	Value (r)
Wing Weight (WW)	Body Weight (BW)	Male	0	Log BK -0.02 + 0.12 Log BB	0.9957
			1	Log BK -0.01 + 0.50 Log BB	0.9999
			2	Log BK 0.01 + 0.58 Log BB	1.0000
			3	Log BK 0.01 + 0.62 Log BB	1.0000
			4	Log BK 0.01 + 0.64 Log BB	1.0000
			5	Log BK -0.01 + 0.66 Log BB	1.0000
		Female	0	Log BK -0.07 + 0.15 Log BB	0.9922
			1	Log BK -0.01 + 0.48 Log BB	0.9999
			2	Log BK -0.01 + 0.57 Log BB	1.0000
			3	Log BK 0.01 + 0.62 Log BB	1.0000
			4	Log BK 0.01 + 0.64 Log BB	1.0000
			5	Log BK 0.01 + 0.66 Log BB	1.0000
Upper Thigh Weight (UTW)	Body Weight (BB)	Male	0	Log BK -0.01 + 0.50 Log BB	0.9999
			1	Log BK 0.01 + 0.55 Log BB	0.9999
			2	Log BK -0.01 + 0.63 Log BB	0.9999
			3	Log BK -0.01 + 0.69 Log BB	0.9999
			4	Log BK -0.01 + 0.71 Log BB	1.0000
			5	Log BK 0.01 + 0.71 Log BB	0.9999
		Female	0	Log BK -0.02 + 0.52 Log BB	0.9999
			1	Log BK -0.01 + 0.54 Log BB	1.0000
			2	Log BK 0.01 + 0.63 Log BB	1.0000
			3	Log BK -0.01 + 0.66 Log BB	0.9999
			4	Log BK 0.01 + 0.69 Log BB	1.0000
			5	Log BK 0.01 + 0.71 Log BB	1.0000
Lower Thigh Weight (LTW)	Body Weight (BB)	Male	0	Log BK 0.01 + 0.01 Log BB	0.0012
			1	Log BK -0.01 + 0.54 Log BB	0.9998
			2	Log BK -0.01 + 0.61 Log BB	0.9999
			3	Log BK 0.01 + 0.65 Log BB	1.0000
			4	Log BK -0.01 + 0.67 Log BB	1.0000
			5	Log BK -0.01 + 0.68 Log BB	0.9998
		Female	0	Log BK 0.01 + 0.01 Log BB	0.0011
			1	Log BK -0.04 + 0.53 Log BB	0.9995
			2	Log BK -0.01 + 0.61 Log BB	1.0000
			3	Log BK -0.01 + 0.64 Log BB	1.0000
			4	Log BK 0.01 + 0.68 Log BB	0.9996
			5	Log BK -0.01 + 0.68 Log BB	1.0000
Breast Weight (BW)	Body Weight (BB)	Male	0	Log BK -0.07 + 0.21 Log BB	0.9791
			1	Log BK -0.01 + 0.62 Log BB	1.0000
			2	Log BK -0.01 + 0.71 Log BB	0.9999
			3	Log BK -0.01 + 0.77 Log BB	0.9999
			4	Log BK -0.01 + 0.80 Log BB	1.0000
			5	Log BK 0.01 + 0.80 Log BB	1.0000
		Female	0	Log BK 0.03 + 0.22 Log BB	0.9992
			1	Log BK -0.08 + 0.58 Log BB	0.9985
			2	Log BK 0.01 + 0.72 Log BB	0.9998
			3	Log BK 0.01 + 0.76 Log BB	1.0000
			4	Log BK -0.01 + 0.78 Log BB	0.9999
			5	Log BK 0.01 + 0.80 Log BB	1.0000

Table 6. Logarithmic Regression Equation for Growth of Carcass Components of Broiler Chicken at Different Sex and Age

Log Y	Log X	Sex	Age	Logarithmic Regression Model	Value (r)
Front Breast Weight (FBW)	Body Weight (BB)	Male	0	Log BK -0.05 + 0.10 Log BB	0.9574
			1	Log BK -0.01 + 0.35 Log BB	0.9993
			2	Log BK 0.01 + 0.49 Log BB	0.9998
			3	Log BK -0.01 + 0.53 Log BB	0.9998
			4	Log BK 0.01 + 0.58 Log BB	1.0000
			5	Log BK -0.01 + 0.58 Log BB	0.9999
		Female	0	Log BK -0.02 + 0.17 Log BB	0.9990
			1	Log BK 0.08 + 0.33 Log BB	0.9951
			2	Log BK -0.01 + 0.48 Log BB	1.0000
			3	Log BK 0.01 + 0.51 Log BB	0.9998
			4	Log BK -0.01 + 0.56 Log BB	0.9997
			5	Log BK -0.01 + 0.58 Log BB	1.0000
Rear Breast Weight (BPD)	Body Weight (BB)	Male	0	Log BK 0.01 + 0.23 Log BB	0.9998
			1	Log BK 0.01 + 0.51 Log BB	0.9999
			2	Log BK -0.01 + 0.59 Log BB	0.9999
			3	Log BK 0.01 + 0.64 Log BB	1.0000
			4	Log BK 0.01 + 0.65 Log BB	1.0000
			5	Log BK -0.01 + 0.67 Log BB	0.9999
		Female	0	Log BK 0.05 + 0.26 Log BB	0.9983
			1	Log BK -0.03 + 0.49 Log BB	0.9992
			2	Log BK 0.01 + 0.58 Log BB	1.0000
			3	Log BK 0.01 + 0.61 Log BB	1.0000
			4	Log BK 0.01 + 0.65 Log BB	1.0000
			5	Log BK 0.01 + 0.66 Log BB	1.0000

The sex factor is very influential on the performance of livestock production caused by an influence on body tissues as well as affecting the growth and percentage of carcasses of livestock as well as gender causing differences in growth rate in sex, then at the same age the male cattle usually grow faster than female cattle, in addition to that the nutritional content of feed also affects the body weight and percentage of carcasses and non-carcasses [26].

4. Conclusions

Based on the results of the study, it can be concluded that the growth and development of carcass components of male and female broiler chickens were not significantly different. The carcass and carcass parts of broiler chickens at 0-5 weeks old show growth patterns that are mature or grow faster than the body as a whole.

REFERENCES

[1] Direktoran Jenderal Peternakan dan Kesehatan Hewan, "Statistik Peternakan dan Kesehatan Hewan 2018," *Kementerian Pertanian Direktorat Jenderal Peternakan dan Kesehatan Hewan. Jakarta,* 2018.

[2] I. Rahayu, H. S., S. Darwati, and A. Mu'iz, "Morfometrik ayam broiler dengan pemeliharaan intensif dan akses free range di daerah tropis," *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, vol. 7, no. 2, pp. 75-80, 2019.

[3] R. Fitro, D. Sudrajat, and E. Dihansih, "Performa ayam pedaging yang diberi ransum komersial mengandung tepung ampas kurma sebagai pengganti jagung," *Jurnal Peternakan*

Nusantara, vol. 1, no. 1, pp. 1-8, 2015.

[4] W. Hasan, A. H. S. Salendu, N. M. Santa, and F. N. S. Oroh, "Analisis keuntungan dan titik impas usaha ternak broiler dengan pola kemitraan (studi kasus di Desa Tetey Kecamatan Dimembe)," *Jurnal Zootek*, vol. 38, no. 1, ppp. 235-243, 2018.

[5] M. K. Umam, H. S. Prayogi, and V. M. A. Nurgiartiningsih, "Penampilan produksi ayam pedaging yang dipelihara pada sistem pemeliharaan lantai kandang panggung dan kandang bertingkat," *Jurnal Ilmu-ilmu Peternakan*, vol. 24, no. 3, pp. 79-87, 2015.

[6] H. Hafid, "Study of growth and distribution of meat and estimation of productivity of fattened cow carcasses," Doctoral Dissertation, IPB Graduate School, Bogor, 2005.

[7] H. Hafid, "Growth and development of noncarcass organs of chicken in different sex and age levels," *Indonesian Journal of Agricultural Research*, vol. 03, no. 03, 2021, pp. 196 – 204, 2021.

[8] P. I. Ayu, N. Suyasa, and E. S. Rohaeni, "Pertumbuhan dan Persentase Karkas Ayam Kampung Unggul Badan Litbang (KUB) pada Pemberian Ransum yang Berbeda," *Prosiding Seminar Nasional Inovasi Teknologi Pertanian*, Banjarbaru, 2016.

[9] H. Hafid, R.E. Gurnadi, R. Priyanto and A. Saefuddin. "Identification of carcass characteristics for estimating the composition of beef carcass," *Journal of the Indonesian Tropical Agriculture*, vol 35, no 1, pp. 22-26, 2010.

[10] H. Hafid, A. Napirah and N. Marlina, "The comparison of carcass production of native chicken based of slaughtering age in traditional farming system." *Proceedings ADRI International Multidicplinary Conference 12th.* Bogor. Page 189-191, 2017.

[11] R. Pahlevi, H. Hafid, and A. Indi, "Final weight percentage of carcass and abdominal fat of broiler chickens with betel leaf extract (Piper betle L.) in drinking water," *Journal of Tropical Animal Husbandry Science and Technology*, vol 2, no 3, pp.1-7, 2018.

[12] W. Indra, W. Tanwiriah, T. Widjiastuti "Bobot Potong, Karkas, Dan Income Over Feed Cost Ayam Sentul Jantan Pada Berbagai Umur Potong," *Unpad Journals* vol 4, no 3, pp.1-10, 2015.

[13] E.O.S. Hussein, G. M. Suliman, A. N. Al-Owaimer, S. H. Ahmed, A. M. Abudabos, M. E. Abd El-Hack, A. E. Taha, Islam M. Saadeldin, and A. A. Swelum. "Effects of stock, sex, and muscle type on carcass characteristics and meat quality attributes of parent broiler breeders and broiler chickens," *Poultry Science* 98:6586–6592, 2019.

[14] H. Hafid, Rahman, Nuraini, Y. Wati, Inderawati, S.H. Ananda and L. Ba'a. "Production of broiler chicken carcass fed on rice bran biomass on different marketed ages," *IOP Conf. Series: Earth and Environmental Science* 209 (2019) 012008, 2018.

[15] J. Pandiangan, "Penetapan Rumus Regresi Terhadap Penentuan Bobot Karkas Berdasarkan Bobot Hidup Sapi Persilangan Simmental Di Rumah Pemotongan Hewan (RPH) Lubuk Buaya Kota Padang. Fakultas Peternakan Universitas Andalas. Padang." 2016.

[16] N. Ulupi, H. Nuraini, J. Parulian, dan S.Q. Kusuma. "Karakteristik Karkas dan Non Karkas Ayam Broiler Jantan dan Betina pada Umur Pemotongan 30 Hari," *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, vol 6, no 1,pp.1-5, 2018.

[17] L. Uhlírová, E. Tůmová, D. Chodová, J. Vlčková, M. Ketta, Z.Volek, and V. Skřivanová, "The effect of age, genotype andsex on carcass traits, meat quality and sensory attributes of geese.Asian-Australas," *J. Anim*. Sci. 31:421–428, 2018.

[18] K. Z. Walita, J. Tanganyika, and S. R. Mussah. "Effect of sex, type of feed and age at slaughter on carcass yield characteristics of Japanese quails (Cortunix Japonica) in Malawi". *Int. J. Avian Wildlife Biol*. 2:50−53, 2017.

[19] M. I. Zajulie, M. Nasich, T. Susilawati, dan Kuswati. "Distribusi Komponen Karkas Sapi Brahman Cross (BX) Hasil Penggemukan Pada Umur Pemotongan Yang Berbeda," *Jurnal Ilmu-ilmu Peternakan*, vol 25 no 1,pp. 24-34, 2015.

[20] R. Karno, "Hubungan Umur dan Jenis Kelamin Terhadap Bobot Badan Sapi Bali di

Kecamatan Donggo Kabupaten Bima," *Skripsi. Fakultas Sains dan Teknologi Universitas Islam Aluddin. Makassar*, 2017.

[21] J. A. Rodríguez, and A. Teixeira, "Slaughter weight rather than sex affects carcass cuts and tissue composition of Bisaro pigs," *Meat Science* 154: 54–60, 2019.

[22] P. C. Muth, and A. Valle Zárate, "Breast meat quality of chick-ens with divergent growth rates," *Arch. Anim. Breed.* 60:427–437, 2017.

[23] D. Ratnasari, A. Atabany, B. P. Purwanto, dan L. B. Salma, "Model Pertumbuhan Sapi Perah Friesian Holstein (FH) dari Lahir sampai Beranak Pertama di BBPTU-HPT Sapi Perah Baturraden Menggunakan Model Matematik Logistic," *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, vol 7, no 1, pp. 18-21, 2019.

[24] I. P. Sampurna dan I. K. Suatha, "Pertumbuhan Alometri Dimensi Panjangdan Lingkar Tubuh Sapi Bali Jantan," *Jurnal Veteriner* , vol 11, no 1, pp. 46-51, 2011.

[25] A. Sabbioni, V. Beretti, M. Ablondi, F. Righi, and P. Superchi, "Allometric coefficients for carcass and non-carcass components in a localmeat-type sheep breed," *Small Ruminant Research* 159, 69–74, 2017.

[26] Suparman, H. Hafid, dan L.O. Ba'a, "Kajian pertumbuhan dan produksi kambing peranakan ettawa jantan yang diberi pakan berbeda," *JITRO* 3 (3), 2016.