ISSN 1682-8356
ansinet.org/ijps

INTERNATIONAL JOURNAL OF

POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 11 (10): 644-648, 2012
ISSN 1682-8356

Effective Temperature at Finisher Phase to Promote Relative Growth Rate of Broiler Strain Cobb

Herawati[1] and Gatot Adiwinarto[2]
[1]Faculty of Veterinary Medicine, Brawijaya University, Indonesia
[2]Extention Agriculture College, Magelang, Indonesia

Abstract: The objective of this research was to determine the relative growth rate of carcass and their components of Broiler Strain Cobb which were kept at different temperatures. Used 90 male broiler chickens with an average body weight 736.57±39.16 grams. "Split plot" form of the series on home treatment with three different temperatures T_1 (34-36°C), T_2 (29-32°C) and T_3 (20-24°C) was used to analyze the date. The research used RAL basic design, every test was subject to withholding of 3 ages of 28, 35 and 42 days. The parameters studied were the relative growth rate of the chest, thigh, upper thigh, meat and bone. The results showed that the relative growth rate of carcass weight increased and followed with growth of life. At 20-24°C carcass maintenance grew faster (ß>1) from the live weight growth, at all temperatures 34-36°C and 29-32°C carcass growth was equal to the live weight growth (ß=1), relative growth of the chest was similar with the live weight growth, at the temperature of 34-36°C, 29-32°C and 20-24°C, the growth rate of the upper thigh ("thigh") was relative with the live weight growth, which shows the value of ß=1, meaning that growth is equal to the live weight growth, relative growth rate of meat at 20-24°C was more rapid than the growth of carcass (ß>1), but generally at a temperature of 34-36°C, 29-32°C and 20-24°C the growth rate was same as the growth rate of carcass, (can be seen from the value ß=1). The conclusion for the relative growth rate of organs is generally similar to the live weight growth and carcass weight at various temperatures of maintenance. Relative growth rate is faster than the live weight growth at temperature of 20-24°C. Relative growth rate of beef is faster than the live weight growth of carcasses at a temperature of 20-24°C.

Key words: Broiler breeders, genetic improvement, environmental temperature

INTRODUCTION

Broiler breeders maintained, the more rapid growth, due to genetic improvement breeder results are supported by appropriate environmental factors. This rapid growth is inversely proportional to body surface area, which affects the rate of body heat dissipation, which is influenced by environmental temperature. Environment that affects the growth of broiler chickens, among others, is the temperature. Charoen Pokphand (2001) in Indonesia is lowland temperatures range between 23-28°C throughout the year. Temperatures above 32°C will result in widening (dilation) of blood vessels, significantly. This condition will lead to drop in chicken blood pressure and heart work harder. If this takes place in a relatively long time, then the chicken will experience further stress the dead, caused the heart failure, sudden death ("sudden death syndrome").

The problems faced by broiler in tropical countries is the environmental temperature which is above the temperature thermo neutral, other than that in Indonesia there are many broiler strains circulating in the market, with properties different. The problem here is where the optimum strain maintained in the tropics such as Indonesia.

The growth of livestock can be observed by changes in weight, size and shape and body composition, including changes in body components such as muscle, fat, bones and organs as well as chemical components. Growth of poultry in general is not much different from other livestock growth.

The purpose of this study was to determine the growth rate of organs relative to the growth of live weight and carcass weight in broiler cob strains are maintained at different temperatures.

MATERIALS AND METHODS

Broiler strains used were Cobb 90 tails. Since age a day until age 21 days kept in cages with a size of 3 x 20 meters. In the phase of "starter" chicken maintained in brood stock ("brooder"), according to heat requirements, the first week of 35°C, 32-35°C into two, to three 25-30°C. Since age 21 days of phase "finisher" or chicken experiments included in a different room temperature according to the treatment.

Disinfectant material is Neo Antiseptic, Formalin and Lime oxide. Used vitamins are Vitabro, Vita stress and vitamin growth while medicines used for prevention of disease are Fluxamicyn and broad-spectrum antibiotics.

ND vaccines using vaccine hatching eyes and drinking water, Gumboro vaccines A and B. Kerosene, rice husks, plastics, light bulbs.

Used 3 pieces of equipment a closed cage, fans, air conditioners, thermo regulator, where food and drink,

Corresponding Author: Herawati, Faculty of Veterinary Medicine, Brawijaya University, Indonesia

brooder, electric scales with a sensitivity of 0.1 gram and a host of other equipment that support the maintenance of broiler chickens.

This study uses three maintenance treatment with difference in temperature: high temperature (34-36°C), medium temperature (29-32°C) and low temperature (20-24°C). Each treatment was repeated 5 times, which is placed in cages consisted of cutting the age of three plots.

Feed concentrates to be used are for phase "starter" nutrient content Protein 20.57%, fat 1.49%, dry matter 86.79%, crude fiber 1.21%, ash 5.52% and 3705.70 kcal energy/kg and the phase of "finisher" nutrient content of feed is protein 18.76%, fat 2.83%, dry matter 88.52%, crude fiber 2.18%, 4.50% ash and energy 3933.62 kcal/kg (Analysis Laboratory).

Research conducted at the Laboratory of Poultry/ Livestock Miscellaneous, College of Agricultural Extension (STPP) Magelang, located in the Purwosari village, District Tegalrejo, Magelang regency starting from age 21 days to harvest age 42 days.

Experimental design used is the "split-plot" in the form of series which uses a cage with 3 kinds of different temperatures as a series of studies, using randomized complete a basic design (CRD). Three treatment enclosure temperature difference T_1 (34-36°C), T_2 (29-32°C) and T_3 (20-24°C), with Cobb broiler strains, each treatment was repeated 5 times. To obtain data on the relative growth rate analysis done cutting serial 3 times cutting, at the age of 28, 35 and 42 days.

Chicken experiment included in room trials since age 21 days. To prevent heat stress, setting the room temperature gradually.

The size of the study is a room 3 meters x 4 meters. At room 20-24°C is used with AC cooling trademark "TCL", "Room Air Conditioner" Piping Kits. At room 34-36°C and 29-32°C heating of the sources used incandescent bulbs; air circulation is regulated by "blower exhause".

Cutting cattle performed at the age of 28, 35 and 42 days, was cut after fasted for 12 hrs. Hair removal done, without using water (to dry), further broken down to separate the organs of the body, excreta, blood, feathers, carcasses. Carcasses were separated between the flesh and bones, then each part weighed. To prevent evaporation of the separate parts of the body put in a plastic bag, the decomposition is done by using a scalpel.

The parameters taken in this study were feed intake, body weight gain, live weight, carcass weight and "Feed Conversion Ratio" (FCR) to measure the performance of broiler chickens. Another parameter is the component that consists of carcass weight of the chest “breast part", under thigh "drumstick" upper thigh "thigh" and the carcasses of meat and bone, was used to measure the growth rate relative.

The boundaries of the parameters to be used in the study were as follows:

1) The weight of life, derived from chicken weighing after fasted for 12 hrs, at the age of 28, 35 and 42 days, in units of grams.
2) Weight of carcass weight to live weight minus the blood, feathers, viscera, head and neck and legs. Head and neck cut on the neck vertebrae 14, the foot is cut on the joint tibiatarsus, Blood is blood coming out after cutting, viscera consist of digestive tract and is still shipped with giblet, in units of grams.
3) The weight of meat carcasses. Organ weight of muscle, skin and fat carcasses that have been separated from the bone, in units of grams.
4) Carcass bone weight. Carcass weight of the bones that have been separated between the flesh and bone, in units of grams.
5) Chest, consisting of the sternum bone and muscle-related, in units of grams.
6) Upper thigh or "thigh", separated on the acetabulum, pelvic floor muscles, pelvic bones join together with the back, in units of grams.
7) Under the thigh or the "drumstick", cut at the joints of the femur and tibia, in units of grams.

Chicken cut in serial experiments at the age of 28, 35 and 42 days, cut randomly determined. Each cutting as many is five birds per cage. Relative growth of carcass and carcass components of the variable "independent" is structured as follows:

Carcass components relative growth rate, measured by the equation algometry temperature of maintenance, testing performed by t-test difference by comparing between t_{count} with t_{table}, which if the value t_{count} is greater than t_{table}, the growth of organs different with the carcass growth ($ß \neq 1$).

Equation model: $Y = a.X^b$ or using calculate

$$\text{Log } Y = \log a + b \log X$$

Hyphotesis Ho: ß=1 or

There is no difference between the growth rate carcass relative and carcass components with life weight.

Hyphotesis H_1: $ß \neq 1$

There is difference between the growth rate carcass relative and carcass components with life weight.

Table 1: Parts of organs (Y) which observed growth relative to certain body weight growth (X)

	Y	X
1	Carcasses weight	Live weight
2	Chest weight	Live weight
3	Thigh weight	Live weight
4	Drumstick weight	Live weight
5	Carcasses beef	Carcasses weight
6	Carcasses bone	Carcasses weight

Table 2: Interpretive value of b In the equation algometry log Y = log a + b log x (Natasasmita, 1978)

No		ß<1	ß=1	ß>1
1	The growth rate of Y relative to the growth of X	Slow	Similar	Fast
2	Character (when) adult Y relative to the character (when) adult X	Early	Medium	Slow
3	Growth Potential of Y relative to growth potential of X	Weak	Medium	Strong
4	Fixed percentages (weight) Y relative to (weight) X	Reduced	Equal	Increase

The growth rate is measured by the equation $Y = a.X^b$ algometry to determine the relative growth of carcass, carcass parts, meat and bone as the dependent variable (Y) with live weight and carcass weight as the independent variable (X). The relationship of X and Y is expressed by the use of logarithmic transformation of Huxley equation is log Y = log a + b log X. B and A values calculated by the least squares method (Steel and Torrie, 1991). To determine the relative growth rate of description of carcass (meat and bone), to determine differences in growth rate and growth of beef carcasses with carcass bones in each treatment performed the t test, against the growth coefficient b. If the Algometric growth coefficient b=1, then both components grow at the same rate. If b<1, the components of the body (Y) grows more slowly than the body (X) and if b>1, indicating relatively faster growth of the body.

RESULTS AND DISCUSSION

The relative growth rate of carcasses with live weight: Coefficient magnitude of the relative growth of carcass to live weight is presented in Table 3. It appears that the growth rate is equal to the live weight of carcass, meaning that the ratio between the carcass and non carcass is relatively fixed because there is no change in the proportion of live weight.

With increasing live weight, carcass and non carcass increased with the same speed. This phenomenon applies force on chickens that are maintened at temperature of 34-36°C, 29-32°C and 20-32%.

Statistical analysis of data with algometry can be seen in Table 3. The data shows that the growth rate of carcass was relative to the growth of live weight, at 20-24°C, carcass maintenance grew faster (ß>1) than the live weight growth, at all temperatures 34-36°C and 29-32°C carcass growth was equal to the live weight growth (ß=1).

The coefficient of carcass growth of live weight was greater than 1, means the carcass grow faster than the live weight, as seen previously, at the age of 42 days to have high live weight, PBB and carcass. Excess of some parameters may occur due to the faster growth rate than carcass weight to live where this means that the proportion of non-carcass components lowers. In other words, components that rise higher hence live weight, carcass and PBB also higher.

The relative growth rate of chest with live weight: Relative growth rate of live weight of the chest on the growth is shown in Table 4. These data indicate that the relative growth of the chest similar to the live weight growth, at the temperature of maintenance 34-36°C, 29-32°C and 20-24°C. Presumably the same growth as the market broiler that were genetically modified to have the same relative productivity. This means that if there is a difference, not flashy or very small (Minister of State for Research and Technology, 2005).

Table 3: Intercept (a) and the rate of growth carcasses relative (b) with live weight of broiler

Temperature	a	B	ß	R
34-36°C	-0.5388	1.1235	ß=1	0.9718
29-32°C	-0.4796	1.1038	ß=1	0.9795
20-24°C	-0.4640	1.0942	ß>1	0.9989

Table 4: Intercept (a) and the coefficient of relative growth rate of chest (b) with live weight of broiler

Temperature	a	B	ß mean	R
34-36°C	-0.8820	1.0587	ß=1	0.8383
29-32°C	-1.5859	1.2848	ß=1	0.99457
20-24°C	-0.9724	1.0936	ß=1	0.9814

Chest includes the main components of the carcass and composed mainly of meat (muscle) and a bit of cartilage. The growth rate of the chest similar to the live weight growth means increasing the weight of life does not cause changes in the ratio of this chest against the live weight. However, when seen from the large chest growth rate of live weight (b = 1.0936), roughly equal to the growth rate of carcass meat (Table 7), with a large b=1.0634. Growth coefficient was statistically greater than 1 or more rapid growth rate of meat from the carcass, but not greater than the rate of live weight. This also means that the greater proportion of meat carcasses by increasing the carcass weight.

The relative growth rate of drumstick with live weight: Table 5, shows that all of carcasses organs, drumstick and chest have the same growth rate with their body.

The relative growth rate of thigh with live weight: The growth rate of the upper thigh ("thigh") relative to the live weight growth, can be seen in Table 6, which shows the value of ß=1, meaning that growth is equal to the live weight growth. Even though the front has stated that consumption, PBB, live weight, carcass and FCR are affected by temperature maintenance but growth relatively unaffected by the presence maintenance with high temperature, medium or low. Upper thigh is hidden in the carcass of the body functions as a buffer body, loads more supported by the lower thigh ("drumstick").

Table 5: Intercept (a) and coefficient of relative growth rate of drumstick (b) with live weight of broiler

Temperature	a	B	ß mean	R
34-36°C	-2.1813	1.3987	ß=1	0.9303
29-32°C	-1.4513	1.1549	ß=1	0.9649
20-24°C	-1.2711	1.091	ß=1	0.978

Table 6: Intercept (a) and coefficient of relative growth rate of thigh (b) with live weight of broiler

Temperature	a	B	ß mean	R
34-36°C	-1.1691	1.0725	ß=1	0.8643
29-32°C	-1.6874	1.2368	ß=1	0.8219
20-24°C	-1.6396	1.2144	ß=1	0.9498

Table 7: Intercept (a) and coefficient of relative growth rate of beef (b) with broiler carcass

Temperature	a	B	ß mean	R
34-36°C	-0.0858	0.9945	ß=1	0.9822
29-32°C	-0.2849	1.0643	ß=1	0.9973
20-24°C	-0.2884	1.0634	ß>1	0.9972

The relative growth rate of beef and carcass bone with carcass: The growth rate of carcass beef for carcass growth is presented in Table 7. Relative growth rate of meat as seen from the value of b which describes the rate of growth compared with the carcass meat of broiler maintaining the temperature between high temperature of 34-36°C, medium temperature was 29-32°C and lower temperature 20-24°C, after statistical analysis with algometry equation using t test to determine differences in growth between the meat compared with the carcass. From Table 7 can be seen that the relative growth rate of meat at 20-24°C more rapidly than the growth of carcass (ß>1), but generally at a temperature of 34-36°C, 29-32°C and 20-24°C showed relative growth rate as compared with the growth rate of carcass, (can be seen from the value ß=1). Temperature of 34-36°C can be produced meat growth of linear equations (ßd) on the growth of the carcass, at YD = -0.0858 + 0.9945 X, (r = 0.9822) and t test obtained at relatively similar growth with meat carcasses growth.

The growth rate of meat that looks have a number different but not statistically different compared with the carcass growth, such things as the speed of growth in the period of "finisher" have come to the meat growth, where growth in broiler in the early days ("starter") that grows is a further meat or bone and muscle which is the principal constituent of the carcass. It is appropriate that the pointed out by Montgomery (1962) in Amsar (1982) the greatest number of muscle cells occurs at birth or shortly thereafter. Muscle growth after birth is caused entirely by the hypertrophy of muscle fibers that exist at birth. Similarly Desianto (2005) are physiological phases "finisher" pattern of growth occurs by cell enlargement ("hypertrophy").

Carcass bone growth rate (ßt) in Table 8 shows the temperature of 20-24°C grew relatively slower than the carcass growth (ß<1), but other growth similar with the

Table 8: Intercept (a) and coefficient of relative growth rate of bone (b) with broiler carcass

Temperature	a	B	ß mean	R
34-36°C	-0.7445	1.0216	ß =1	0.7990
29-32°C	0.1080	0.7236	ß =1	0.9021
20-24°C	0.0835	0.7399	ß<1	0.9038

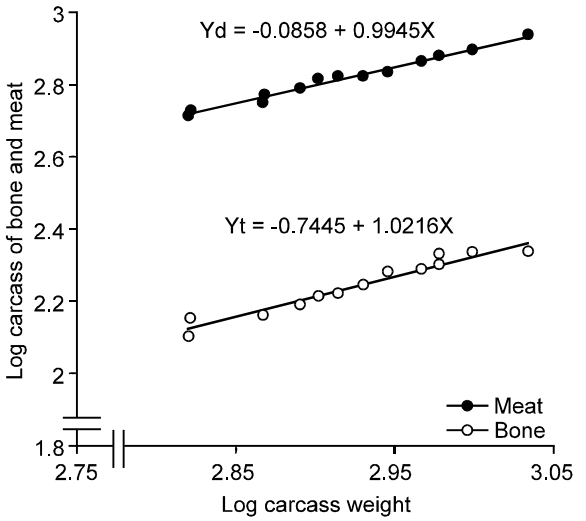

Fig. 1: The growth rate of beef and bone broiler strain cobb at the temperature of maintenance 34-36°C

carcass growth. Maintaining the temperature of 34-36°C on the carcasses growth obtained the regression equation Yt = -0.7445 + 1.0216 X, (r = 0.7990); based on statistical analysis by t test obtained ß = 1 is thus the same relative with carcass bone growth compared to carcass growth. The average number obtained in the regression equation varies but after seen from the value "ß" is no different, when seen from the value of "r" as the closeness of the relationship that is lower than the "r" meat. It thus due to growth when the "finisher" is the growth in the second stage of the process of physiological growth. Bone growth has not stopped still follow the growth and stops at a certain time.

It has been argued by Soeparno (1992), that the differential growth ratio: (1) growth on the basis of weight, components of the body reaches maturity with the sequence of bone, muscle and fat, (2) in line with the increase in empty body weight, the weight of each component increased, while the proportion of carcass bone decreased, increased fat and muscle is almost constant and (3) the composition of the carcass is not dependent on age and nutritional background. Graph the growth rate of meat and bone can be seen in Fig. 1.

The growth rate at 29-32°C temperature maintenance, organ meat and bones carcass carried out at the age of 28, 35 and 42 days compared with carcass growth. The results showed that the growth of meat YD = -0.2849 + 1.0643 X, (r = 0.9973), algometry analysis was performed with the t test, the results obtained (ß=1), this

means that the rate of growth equal to growth in meat carcass. The rate of bone growth relative to growth carcass 0, 0.1080 obtained equation Yt = + 0.7236 X; (r = 0.9021), statistical analysis was performed with the t test results showed the same relative bone growth with the growth of carcass. Meat and bone growth from the same despite the closeness of the relationship of meat that is more determining than the bone, this is in conformity with the growth of naturally after bone growth then continued on the growth of meat. It thus agrees with Hammond (1932) cited by Soeparno (1992) who argued that the organs achieve maximum growth in sequence starting from the nervous organs, bones, muscles and fat. More information about the growth and development of organs, is generally asserted that the same sequence with some variation, for example from the central nervous system, bone, tendon, muscle, fat and subcutaneous fat intramuscular (Palsson and Veges, 1952a; McMeekan, 1959; Fourie *et al*., 1970 are cited by Soeparno, 1992).

Broilers maintained at 20-24°C, a low temperature for broiler chicken phase "finisher". At a temperature of meat maintenance showed relatively faster growth than the growth of carcass (visible from the value of ß>1). Linear equations Cobb strain YD = -0.2885 + 1.0634X; (r = 0.9972), after testing b against 1 by using the t test values obtained by the growth of ß = 1, thus growing with the growth of carcass meat. Bone growth Yt = 0.0835 + 0.7399X; (r = 0.9038), performed against a test b using the t test, obtained ß≠1, which means slower bone growth compared to carcass growth. During bone growth levels grow continuously with the same growth rate relative to the carcass, as well as muscle growth is relatively the same, so the ratio of muscle to the bone during grows together (Soeparno, 1992).

Conclusion: The growth rate of organs generally is similar to the growth of live weight and carcass weight at the various maintenance temperatures. The growth rate relative of carcass is faster than the live weight growth at temperature of 20-24°C. The relative growth rate of beef is faster than the carcass growth at maintenance temperature of 20-24°C.

REFERENCES

Amsar, 1982. The Growth Physiology. Post Graduate Program. Agriculture Institute Bogor.

Charoen Pokphand, 2001. The weakness of modern broiler. Bull. Service, 20: 2-3. Surabaya.

Desianto, B.U., 2005. The treatment of modern broiler. Poult. Indonesia, 299: 20-24.

Hammond, J., 1932. Growth and Development of Mutton Qualities in Sheep. Oliver and Boyd. London.

McMeekan, C.P., 1959. Principles of Animal Production. Whitcombe and Toombe Ltd.

Montgomery, R.D., 1962. Observation on Cyonide Content and Taxicity of Tropical. W. Indian Med. J., 13: 1-11.

Natasasmita, A., 1978. Body composition of swamp buffalo (Bubalus bubalis), a study of development growth and sex differences. PhD thesis. Australia: University of Melbourne.

Soeparno, 1992. Meat Science and Technology. Gadjah Mada University Press, Yogyakarta.

Steel, R.G.D. and J.H. Torrie, 1991. Prinsip dan Prosedur Statistika. PT. Gramedia Pustaka Utama, Jakarta. (Diterjemahkan oleh B. Sumantri).

Sudarmoyo, B., 1982. The Effect of Sex to the Growth of The Body dan Carcass of Nut Goat. Thesis of Post Graduate Program. Agriculture Institute. Bogor.

Technology and Research Ministry, 2005. The Farming of Chicken Strain Meat. Budidaya_peternakan_idx. php.htm.com.IPTEKnet.