The effect of early feed restriction on the commercial pieces of two broiler chicken strains

by Jola Londok 8

Submission date: 15-Sep-2022 12:19PM (UTC+0700)
Submission ID: 1900252109
File name: ct_of_early_feed_restriction_on_the_commercial_pieces_of_two.pdf (550.64K)
Word count: 4085
Character count: 20223

IOP Conference Series: Earth and Environmental Science

The effect of early feed restriction on the commercial pieces of two broiler chicken strains

The effect of early feed restriction on the commercial pieces of two broiler chicken strains

J J M R Londok[1*] and J E G Rompis[2]

[1]Department of Animal Nutrition, Animal Husbandry Faculty Sam Ratulangi University, Jl. Kampus Unsrat Manado North Sulawesi 95115.
[2]Department of Animal Production, Animal Husbandry Faculty Sam Ratulangi University, Jl. Kampus Unsrat Manado North Sulawesi 95115.

[*]Email: jolalondok_unsrat@yahoo.com

Abstract. The aim of this research to evaluate the effect of feed restriction (FR) on starter periods of two different broiler strains on commercial meat pieces. The study was conducted on 120 day old chicks with an average body weight of Lohman strain of 44.16 ± 3.72 g and Cobb strain of 45.79 ± 3.95 g. The method was a completely randomized design (CRD) factorial 2x4 with 3 replications. The factor A1 was Lohman, and A2 was Cobb. Factor B was the start of the application of FR as much as 20% for 8 days, namely B0 = without FR, B1 = on day 8, B2 = on day 11, and B3 = on day 14. Feed was given *ad libitum* before and after FR until day 35. The interaction between treatment affect the carcass (%) and brisket (%). final body weight (FBW), carcass (%), breasts (%), and wings were affected by strains. FBW, carcass (%) and breast (%) of Lohman strain were higher than Cobb. The wings (%) and brisket (%) of Cobb were higher than Lohman's. The application of FR on the Lohman at starter period was better than Cobb in terms of the percentage of commercial pieces.

1. Introduction

Characteristic of life is growing, and growing is an assimilation event. A very simple definition of growth is a change that can be observed, measured in the form of length, content or period [1]. Furthermore, changes occur in an organ / tissue or organism of living things is a manifestation of changes in the value of the smallest unit, namely cells undergoing changes in both cell numbers (hyperplasia) and cell enlargement (hypertrophic). Basically cell multiplication occurs in the organs / tissues of the body at the beginning of the life period (pre natal) followed by cell enlargement in the post natal period according to the hierarchy, character and size of each cell, so that growth can have an impact on organ weight or tissue carcass components (bone, muscle, fat). The rate of growth varies depending on genetic traits and environmental factors (management, food, disease) [2]. Sex and genetic affected the relative growth of tissue forming carcasses [3]. Meat production produced by each type and individual of broiler chicken varies due to different growth speed factors and impacts on the economic value of each individual and type of broiler chicken. Broiler chicken specific selection with a fast growth rate in the poultry industry produces strains with high body weight with a short maintenance period. Selection effects are reflected in growth patterns, metabolism, endocrine function and immune system which ultimately also relate to mortality rates and the welfare of livestock that grow very fast. Within 5 weeks chicken body weight can reach 50 times the initial weight. This is an

extraordinary achievement in terms of genetics and improvement in the quality of feed. Fast growth tends to produce fatty or fat deposits in broilers due to high appetite [4]. There are two main aspects to be achieved from the objectives of animal production, namely the quantitative aspects in it can be measured from rhythm, reproductive performance, growth speed and qualitative aspects, namely the results of changes in each organ or tissue forming carcasses [1]. Furthermore, that carcass quality is influenced by the proportion of edible meat percentage in carcass and the proportion of each organ or major tissue carcass (bone, muscle and fat) and specifically excess fat can reduce carcass quality [5]. Compensatory growth is a genetic potential of individual livestock where both cell accretion and enlargement can occur after a certain period after the animal experiences restrictions on food organisms experiencing a food deficit [1]. The importance of growing compensation for livestock that has feed restriction will be largely determined by the length and severity of food restrictions. Obviously the severity of food restrictions is influenced by the quantity and quality of feed given and the length of the compensation period after experiencing feed restrictions. The success of products from compensation growth is also strongly influenced by the age factor of livestock when food restrictions are carried out. Feeding restriction program at the earlier of broiler life is one alternative to reduce problems related to the rapid growth rate [6]. The advantages of applying feed restrictions to broilers at the beginning of their lives can provide a higher production index compared to controls with lower feed costs of 3.28% [7]. Feed restriction of 77% ad libitum and 50% ad libitum with a restriction period of 5,7, and 9 days had higher nitrogen digestibility and nitrogen retention compared to ad libitum feeding [8]. By reducing feed consumption, poultry can reduce energy consumption and carcass fat deposition at market age [9].

The series of studies to study the effect of restrictions on feed consumption (feed restriction) and the response of livestock to compensatory growth of broilers with the aim of increasing feed efficiency, and carcass quality have been carried out since 2010. Restrictions as much as 70 % for 6 and 9 days provides different efficiency of feed use. Restrictions feed as much as 10% from basic rations that are applied for 7 days, reduce consumption, and gain weight but do not affect the efficiency of ration use, and are able to improve carcass quality [10]. Furthermore, feed restrictions up to 20% provide the best feed conversion. Qualitative feed restriction with crude fibre levels (up to 10%) and duration of administration (up to 16 days) resulting showed no interaction between the two factors on meat performance. The tolerance of broilers to the length of feeding is only up to 8 days with crude fibre content up to 10% in the ration seen from consumption, weight gain and efficient use of rations. Duration of feeding up to 16 days tends to reduce carcass and abdominal fat weight but has not affected serum cholesterol levels, weight of organs and digestive organs [11]. Feed restriction is a limited feeding program for livestock at a certain age and period [12]. Restricted feeding programs are one of the strategies proposed as a method to reduce the impact of excessive feed consumption on the ad libitum feeding system. Inconsistencies regarding age began to be applied and the length of feed restrictions was still found in a number of reports. Feed restriction programs at the beginning of the growth period indicating of a decrease in carcass fat and improving the efficiency of feed use [13]. On chicken broilers who restricted to their feed producing high of feed efficiency, reduced body fat content, increased final body weight and reduced feed costs [14]. Feed restrictions in the short period have the ability to catch up with body weight growth after a period of normal feeding [15]. Poultry carcasses are part of poultry which is obtained by halal and correct slaughter, plucked by feathers, excreted offal and abdominal, cut off head and neck and both legs so that it is safe, prevalent and suitable for human consumption [16]. Carcass is the main result of slaughtering livestock that has high economic value [17]. Furthermore, that broiler carcass is meat without bone, after being separated from the head to the base of the neck and from the legs to the knee and from the contents of the chicken abdominal cavity. Carcass production is greatly influenced by its weight, where an increase in live weight will usually be followed by an increase in carcass weight. Commercial pieces are divided into several parts, namely the breast, whole chicken leg (upper thigh) (thigh), lower thigh (drumstick), wings and brisket. The percentage of the breast is expected to have a value that is much higher than the percentage of other commercial pieces. Therefore, the percentage of the breast is an indicator of

carcass quality in broilers, because this part is known for its softer flesh and has a low fat content. Feeding restrictions are programs to provide livestock feed according to their basic needs at a certain age and period. Many problems are quite serious with often appearing in the maintenance of broilers, especially in the tropics, such as death at the end of maintenance, excessive fat, and abnormalities in the legs. One way that can be done to overcome this problem is by feeding restrictions, whether done at the beginning of growth or at the end of growth [7]. Feed restrictions do not have a negative impact on the carcass characteristics produced. Restriction of feed at various frequency of delivery is expected to increase carcass production [18]. Early feed restriction programs intended for reduce carcass fat in broiler chicken and in turn can pursue compensatory growth to produce market body weight and commercial pieces similar to control group.

2. Materials and methods

This study used 200 unsex day old broiler chickens which were kept in brooder cages for 7 days, then on the 8th day, in conjunction with the application of treatment, the bird were weighed and 120 broilers were taken which were uniformly weighted and placed into wire cages, according to the number of experimental units. There are 24 experimental units, each of which was occupied by 5 chickens. The method used in this study was a completely randomized design (CRD) factorial 2x4 treatment pattern with 3 replications. Factor A was a strain of chicken, i.e. A1 was a strain of Lohman and A2 was a strain of Cobb. As factor B was a 20% feed restriction carried out for 8 days starting on a different day, namely B0 was without restrictions, B1 was a feed restriction starting on the 8th day, B2 was a feed restriction starting on the 11th day, and B3 was Feed restrictions begin on the 14th day. There were 8 combinations of treatments that were applied to 24 experimental units consisting of 5 chickens. The feed used was commercial feed (BR 21) for Lohman strains, and CP-11 and CP-12 for Cobb strains with a protein content of 20-22% and metabolic energy 2900-3180 kcal kg^{-1} according to the life period of chickens (Table 1). The standard of feeding per day according to broiler needs is recommended for both strains [22, 23]. Feed was provided by *ad libitum* before and after the application of feeding restrictions until the 35th day.

Table 1. Nutrient Composition and Metabolizable Energy of Commercial Feed

Nutrients	[1]CP 11	[1]CP 12	[2]BR 21
Water (%)	13,00	13,00	12.00
Protein (%)	21,00 - 23,00	19,00 - 21,00	22.00
ME (kcal)	2961	3180	2900
Fiber (%)	5,00	5,00	5.00
Ash (%)	7,00	7,00	-
Calcium (%)	0,90	0,90	1.05
Phosphorus (%)	0,60	0,60	0.85

Source: [1]PT. Chareon Pokphand Indonesia
[2]PT. Sinta Prima Feedmill

At the end of the study the chicken was fasted for 8 hours (overnight) and the next morning chicken was carried out for the measurement of variables. Slaughter was carried out on 3 birds for each unit of experiment, and then values as an average. Cutting was carried out on the neck by cutting the oesophagus, jugular vein, trachea and carotid artery. After that chicken was hung with the head down so that the blood can come out quickly and perfectly, then the chicken was watered with clean water, dipped into hot water 60 ^{o}C for 45-60 seconds then do the extraction manually. After that the internal organs (liver, intestine, gizzard, and heart) were removed and the organs of immunity are separated, namely the thymus, spleen and pharyngeal organs, and cut off the head, neck and claw. Furthermore, the percentage of carcass can be calculated by calculating carcass weight and doing commercial pieces and weighing parts consisting of breast, thighs, wings, and brisket. If there were significant differences between the combination of treatments and their interactions or at least one combination of treatments

and their interactions are significantly different, followed by a honestly significant difference test (HSD).

3. Results and discussion

The average carcass characteristics of 2 strains of broilers that received a feed restriction treatment of 20% for 8 days and started on different days in the starter period were presented in Table 2.

Table 2. Final Body Weight and Commercial Pieces Percentage of Two Strain Broiler Chicken[1]

Variable	Strain	Start of Feed restriction				average±SEM
		Control	day-8	day-11	day-14	
Final body weight	Lohman	2151.00±29.14	1997.33±102.59	1917.00±25.63	1878.33±88.92	1985.92±43.48^{A}
	Cobb	1845.67±42.17	1891.67±19.15	1803.33±29.34	1854.00±40.10	1848.67±8.63^{B}
	Average ±SEM	1998.33±72.02	1944.50±52.13	1860.17±30.81	1866.17±43.96	
carcass persentage (%)	Lohman	79.50±0.91^{AB}	75.22±2.82^{B}	85.71±0.11^{A}	35.74±1.23^{A}	81.54±0.94
	Cobb	77.16±0.24^{B}	76.65±0.48^{B}	73.06±2.79^{B}	74.93±0.59^{B}	75.45±0.52
	Average ±SEM	78.33±0.67	75.94±1.32	79.38±3.09	80.33±2.49	
Breast persentage (%)	Lohman	37.12±1.09	37.77±1.70	34.90±0.66	35.83±2.38	36.40±1.05^{A}
	Cobb	36.37±0.25	34.08±0.69	33.84±1.08	34.39±0.45	34.67±0.45^{B}
	Average ±SEM	36.74±0.38	35.92±1.84	34.37±0.53	35.11±0.72	
Leg persentage (%)	Lohman	26.87±0.98	26.10±1.04	29.12±0.71	22.05±4.40	26.04±1.26
	Cobb	26.92±0.49	28.28±0.26	27.76±0.51	27.79±0.27	27.69±0/27
	Average ±SEM	26.90±0.02	27.19±1.09	28.44±0.68	24.92±2.87	
Wing persentage (%)	Lohman	9.25±0.17	9.10±0.33	9.45±0.32	8.78±0.07	9.15±0.14^{B}
	Cobb	9.77±0.24	9.93±0.12	10.08±0.22	10.04±0.06	9.95±0.06^{A}
	Average ±SEM	9.51±0.26	9.51±0..42	9.76±0.31	9.41±0.63	
Brisket Persentage (%)	Lohman	20.65±1.01^{ab}	18.08±0.26^{b}	19.79±0.38^{ab}	20.00±0.61^{ab}	19.63±0.16
	Cobb	19.44±0.32^{ab}	21.11±0.44^{ab}	20.76±1.05^{a}	20.69±0.37^{ab}	20.50±0.37
	Average ±SEM	20.04±0.60	19.59±1.51	20.28±0.49	20.35±0.34	

[1]values are the means of 3 replications of 10 birds, values are expressed as mean±SEM. $^{A-B}$different superscripts within row shows highly significantly different (p<0.01). $^{A-B}$different superscripts within column shows highly significantly different p<0.01). $^{a-b}$different superscripts within column shows significantly different (p<0.05), $^{A-B}$different superscripts within row and column shows highly significantly different (p<0.01).

There were significant interactions (P<0.01) between treatments for carcass and real percentage variables (P<0.05) to the percentage of commercial brisket pieces. The Lohman strains were significantly higher (P<0.01) 7.42% and 4.99% respectively for the final body weight and breast percentage variables compared to Cobb strains. While the percentage of Lohman strain wings was real (P<0.01) 8.74% lower than Cobb strains. The combination of treatments gave a not significant difference (P>0.05) on the thigh percentage variable. Broiler strains were significant (P<0.01) affecting final body weight, breast weight percentage and percentage of experimental chicken wings, but no interaction between strain and the start of feed restriction was found. Final body weight and breast weight percentage of Lohman strains were very significant (P<0.01) higher than Cobb strains. The highest final body weight and breast weight percentage was indicated by Lohman broiler strain

without feed restriction of 20% for 8 days, and the lowest was indicated by broiler strain Cobb which was restricted to feed starting on the 11th day. In contrast, the percentage of chicken wings tested by Cobb strain was very significant (P<0.01) higher than that of the Lohmann strain. The highest wing weight percentage was shown by broiler Cobb strain with a feed restriction of 20% for 8 days starting on day 11, and the lowest was indicated by Lohmann broiler strain which was restricted to feed starting on the 14th day. The percentage of experimental chicken thighs both strains and the start of feed restriction (20% feed restriction application for 8 days) showed no significant difference (P>0.05). Basically cell multiplication occurs in the organs / tissues of the body at the beginning of the life period (pre natal) followed by cell enlargement in the post natal period according to the hierarchy, character and size of each cell, so that growth can have an impact on organ weight or tissue carcass components (bone, muscle, fat) [1]. Rate of growth varies depending on genetic traits and environmental factors (management, food, disease) [20], sex and race affect the relative growth of tissue forming carcasses [3].

Broiler chicken strains that received a feed restriction treatment of 20% for 8 days and started on different days in the starter period and the interaction of both were very significant (P<0.01) affecting the carcass percentage and percentage of experimental chicken brisket. When the difference in strain and restriction of feed by 20% for 8 days starting on different days shows a real interaction, the difference in strains depending on feed restrictions by 20% for 8 days starts on different days, and vice versa. The response sequence of experimental chickens to the highest to lowest carcass percentage was found in a combination of Lohman strain treatment with application of feed restriction starting on day 14, Lohman strain with application of feed restriction starting on day 11, Lohman strain without feed restriction, strain Cobb without feed restriction, Cobb strain with application of feed restriction starting on day 8, Lohman strain with application of feed restriction starting on day 8, Cobb strain with application of feed restriction starting on day 14, and the lowest indicated in combination Cobb strain treatment with feed restriction application starting on the 11th day. The combination of Lohman strain treatment with the application of feed restrictions starting on the 11th day and 14th day has the same effect on the percentage of carcass. The difference in the strain of broilers that received a feed restriction treatment of 20% for 8 days and began on different days in the starter period improved commercial pieces of experimental chicken. There are indications that the Lohman strain has a better feed restriction response in the starter period compared to the Cobb strain. Carcass composition is influenced by live weight, gender, nutrient content in feed, and feeding program [19]. The amount of meat produced from carcass, as well as the quality of meat and meat products, is influenced by genetic factors, including species, nation, type and individual livestock, and environment including physiological and nutritional factors [20]. Carcass consists of muscle tissues of meat, fat, bone, and residual components, including tendons, connective tissue, blood vessels, and nerves. The ratio between carcass weight and live cut weight, expressed in percentage, is called the percentage of cutting or the percentage of carcass [20]. The most expensive carcass component is meat and the largest part of meat is in the breast, so the size of the chest is used as a measure to compare the quality of meat in broilers [21]. The percentage of experimental chicken carcasses which were treated with a feed restriction of 20% for 8 days and starting on different days in the starter period, in accordance with the recommendation for Lohmann strain of 70%, for body weight in the fifth week of ± 1.8 kg [22] and Cobb strain of 72% for body weight in the fifth week of ± 1.8 kg [23]. The percentage of broiler carcass is 68-72% [20].

4. Conclusion

The application of feed restriction in the starter period of the Lohman strain was better than Cobb strain in response to cutting weight, carcass percentage, and breast percentage, whereas the percentage of wings and back percentage of Cobb strain was better than Lohman strain.

Acknowledgement
Thank you to the Dean of the Faculty of Animal Husbandry, Sam Ratulangi University who facilitated this research in the form of a research enclosure and equipment. We also expressed our gratitude to the Chancellor of the University of Sam Ratulangi for funding the RTUU scheme

References

[1] Benevent 1981 *Quelques Aspects de la Croissance Chez les Animaux Supperieur Delevage*. (Montpellier: ENSA)
[2] Robelin J 1979 *Ann Zootech* **26** 333-46
[3] Prudhon M, Benevent, M Vezinhet, and J P Aat Dulor 1976 *Ann Biol Anim Bioch Biophys* **18** 5-9
[4] Jahanpour M, Seidavi A, Qotbi A A A, Hoven R V D, Silva S R D, Laudadio V, and Tuvarelli V 2015. *Arch Anim Breed.* **58** 99-105
[5] Tulung B 1999 *Isu, Kontroversi dan upaya Penurunan Kolesterol Produk Hewani* (Manado: Universitas Sam Ratulangi)
[6] Butzen F M, A M L Riberio, M M Vieira, A M Kessler, J C Dadalt, and M P Della 2013 *J Appl Poult Res* **22** 251-59
[7] Aziz A, E Manin, and Afriani 2010 *Med.Pet* 33 12-7
[8] Ravel D, Ng'ambi J W, Norris D, and Mbajiorgu C A 2009 *Int J Poult Sci* **8** 35-9
[9] Bortoluzzi C, Fernandes J I M, Contini J P, Gurski T J, Esser A F G, and Prokoski K 2013 *Rev Bras Saude Prod Anim.* **14** 778-84
[10] Londok J J M R, Tulung B, Kowel Y H S, and Rompis J E G 2012 *Proceeding the 2nd International Seminar "Feed Safety for Healthy Food"* (Jatinangor: Universitas Padjajaran)
[11] Tulung B, Londok J J M R, and Regar M N 2015 *Proceeding the 4th International Seminar* (Manado: Sam Ratulangi Univesity)
[12] Santoso U 2001 *J Anim Sci.* **4** 1585-91
[13] Al-Taleb S S 2003 *J. Biol. Sci.* **3** 607-11
[14] Zulfanita E M, Roisu, and Utami D P 2011 *Jurnal Ilmu-Ilmu Pertanian* **7** 59–67
[15] Yu M W and Robinson F E 1992 *J Appl Poult Res*. **1** 147-53
[16] Standar Nasional Indonesia 2009 *Mutu Karkas dan Daging Ayam* (Jakarta: Badan Standarisasi Nasional)
[17] Soeparno 1992 *Ilmu dan Teknologi Daging Edisi I* (Yogyakarta: Gadjah Mada University Press)
[18] Mahmood S, Mehmood S, Ahmad F, Masood A, and Kausar R 2007 *Pakistan Vet J.* **27** 137-41
[19] Leeson S and Summers J D 2008 *Commercial Poultry Nutrition 3rd ed.* (Nottingham: Nottingham University Pr)
[20] Soeparno 2011 *Ilmu Nutrisi dan Gizi Daging* (Yogyakarta: Gadjah Mada University Press)
[21] Muchtadi T R, Sugiyono, and Ayustaningwarno F 2010 *Ilmu Pengetahuan Bahan Pangan* (Bandung: Alfabeta Pr)
[22] Lohmann Meat 2007 *Broiler Stock Performance Objectives* (Albama: Aviagen)
[23] Broiler Performance and Nutrition Supplement 2015 http://www.cobb-vantress.com/docs

The effect of early feed restriction on the commercial pieces of two broiler chicken strains

ORIGINALITY REPORT

17%	13%	15%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	B Etikasari, Husin, S Kautsar, H Y Riskiawan, D P S Setyohadi. "Wireless sensor network development in unmanned aerial vehicle (uav) for water quality monitoring system", IOP Conference Series: Earth and Environmental Science, 2020 Publication	3%
2	Repository.Unej.Ac.Id Internet Source	1%
3	repository.unair.ac.id Internet Source	1%
4	Seruni Binowo, Bernat Tulung, Jola J.M.R. Londok, Mursye N. Regar. "EFEK PEMBATASAN PAKAN DAN SUMBER SERAT KASAR BERBEDA TERHADAP PERFORMA AYAM PEDAGING", ZOOTEC, 2019 Publication	1%
5	S S C Maulid, A Susilo, D Purwanto, Kuswati. "The effect of slaughter age and sex class to carcass characteristic of Red Brahman	1%

Crossbred Cattle", IOP Conference Series: Earth and Environmental Science, 2021
Publication

6	www.researchgate.net Internet Source	1 %
7	www.ncbi.nlm.nih.gov Internet Source	1 %
8	vital.seals.ac.za:8080 Internet Source	1 %
9	inmes.rs Internet Source	1 %
10	repository.umj.ac.id Internet Source	1 %
11	coek.info Internet Source	<1 %
12	www.connectjournals.com Internet Source	<1 %
13	rsdjournal.org Internet Source	<1 %
14	Solmaz Rahimi, Alireza Seidavi, Mahmood Sahraei, Francisco Peña Blanco, Achille Schiavone, Andrés L. Martínez Marín. "Effects of Feed Restriction and Diet Nutrient Density During Re-Alimentation on Growth Performance, Carcass Traits, Organ Weight,	<1 %

Blood Parameters and the Immune Response of Broilers", Italian Journal of Animal Science, 2016
Publication

15	Hayder Bahjat Nasih, Harith B. Abdulrahman, J. Z. Ghassan. "Effect of Agricultural Medium on the Qualitative Characteristics of Two Hybrids of Lettuce (Lactuca Sativa L.) in Hydroponics System", IOP Conference Series: Earth and Environmental Science, 2022 Publication	<1 %
16	G H Tamuntuan, A Tanauma, G Pasau, H Sangian. "Grain size distribution, morphology, and elemental composition of iron sand from North Sulawesi", IOP Conference Series: Materials Science and Engineering, 2019 Publication	<1 %
17	realrecipesid.fun Internet Source	<1 %
18	hdl.handle.net Internet Source	<1 %
19	D. M. N. D. Dissanayake, L. S. David. "Effects of quantitative feed restriction on the performance of broiler chickens", AGRIEAST: Journal of Agricultural Sciences, 2017 Publication	<1 %

20	Rendi Fathoni Hadi, Sudiyono, S. N. Jannah, W. Indriyani. "The effect of enriched perilla seed (Perilla frutescens L.) in the diets on percentage of carcass and non-carcass, chemical quality, and levels of α-linoleic acid (ALA) of meat ducks", AIP Publishing, 2019 Publication	<1 %
21	jnt.ub.ac.id Internet Source	<1 %
22	zootekni.org.tr Internet Source	<1 %
23	A K Wati, R F Hadi, Sudiyono. "Effect of different vegetable oils in rations on chemical quality of local duck meat", IOP Conference Series: Earth and Environmental Science, 2021 Publication	<1 %
24	F.M. Butzen, A.M.L. Ribeiro, M.M. Vieira, A.M. Kessler, J.C. Dadalt, M.P. Della. "Early feed restriction in broilers. I–Performance, body fraction weights, and meat quality", Journal of Applied Poultry Research, 2013 Publication	<1 %
25	Y N Arif, A Pramono, J Riyanto. "The effect of using complete feed containing protected soybean groats on the carcass production of thin tailed lambs", IOP Conference Series: Earth and Environmental Science, 2021 Publication	<1 %

26	animres.edpsciences.org Internet Source	<1%
27	pubag.nal.usda.gov Internet Source	<1%
28	uk.eggersmann.info Internet Source	<1%
29	Audrey Mutiara Setya Arini, Diana Nur Afifah, Fillah Fithra Dieny. "The Effect of Tempeh Gembus Substitution on Protein Content, Calcium, Protein Digestibility and Organoleptic Quality of Meatballs", Current Research in Nutrition and Food Science Journal, 2019 Publication	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		