PROFIT ANALYSIS OF BROILER CHICKENS (Gallus Domesticus) FROM THE USE OF SEVERAL PLANT HORMONES

By
Juna Jakaria Sembiring[1], Media Agus Kurniawan[2] , Meriksa Sembiring[3]
[1,2,3] Program Studi Peternakan Fakultas Sains dan Teknologi, Universitas Pembangunan Panca Budi Medan
Email: [1]junazakaria29@gmail.com

Article History:
Received: 14-02-2024
Revised: 21-02-2024
Accepted: 17-02-2024

Keywords:
Broiler, Hormones, R/C, Profit and Loss, IOFC

Abstract: *The purpose of this study was to determine the effect of plant hormones on property in raising broiler chickens (Gallus domesticus) and to determine the cost efficiency in the use of different plant hormones for broiler chicken*

This study used a non-factorial Complete Randomized Design (RAL) with 5 treatments and 4 repeats. The treatments tested were: Ho (control) without hormones, H1 (Neobro), H2 (banana weevil), H3 (bean sprouts), and H4 (sweet potato shoots). Hormone testing is taken from plants by adding EM4 bioactivators and differentiated sugar drops (molasses) for 1 week except for hormones from bean sprouts. The parameters observed are production cost, total revenue, profit/loss analysis, R/C ratio analysis, and Income Over Feed Cost (IOFC).

From the results of research that has been done, it is obtained that the use of hormones from several plant hormones

INTRODUCTION

Business in the field of broiler chickens is widely developed because it has advantages and advantages in terms of short life to achieve the desired weight, also does not require a large place in the maintenance business, rapid growth and efficiency turn feed into meat production needed (Ensminger et. al. 2004). In addition to its advantages, broiler chickens also have disadvantages such as being susceptible to climate and disease because of low body resistance and easy stress (Bindels et al., 2015). Broiler chicken meat has very potential for protein production. Broilers have the characteristics of large body size with mostly meat but fatty, slow moving, and fast body growth soft and tender smooth texture.

Broiler farming business feed costs are very high reaching 70% of production costs, whereas in this poultry farming business is carried out intensively which is characterized by high productivity because broiler chickens can weigh up to 1.5 kg within 30 days. As the main feed of this poultry is from 100% concentrate, it requires the purchase of feed that is quite high, so profits are very thin for small farmers, especially the price of feed that soars

high / kg so that small farmers who go out of business or look for other alternatives such as concentrates by concocting manually.

Increasing profits can be achieved by adding additives to the feed so that the quantity of feed decreases, where additives function can spur weight growth as done. To reduce feed costs, in broiler chicken feed, feed additives such as AGP (Antibiotics Growth Promoters) are often added, which aims to increase livestock immunity and as a growth trigger. However, AGP has been banned and can be harmful, so other alternatives are needed such as hormones from plants given by mixing with drinking water, such as banana weevils, bean sprouts, and sweet potato shoots where apart from containing hormones and nutrients, banana weevils are used as flour tried on broiler yam given at a rate of 10% along with commercial feed affecting increasing weight as production (Lestari, Rev. Praise, 2018). Protein in Nutrition from plant extracts can affect the productivity level of broiler chickens (Kataren, 2010).

The use of extracts (hormones of some plants such as banana weevils, bean sprouts, and sweet potato shoots apart from containing nutrients (protein, carbohydrates, fats, calcium, phosphorus, and a little iron, and contains vitamins A, B1, vitamin C also contains plant hormones namely gibberellins and cytokinins and also contains microorganisms that are useful for plants, including; microbial solvents phosphate, aspergillus, azopirillium, aeromonas, bacillus, azetobacter cellulotic microbes that can help in livestock development (Artikesiana. 2016).

METHOD

This research was conducted in Sei Mencirm village, Teak Road, Sunggal sub-district. Deli Serdang Regency, North Sumatra Province, with the title "Analysis of Profit of Raising Broiler Chickens (Gallus domesticus) from the Use of Some Plant Hormones" was carried out in a closed cage from November 2023 to January 2024.

Research Methods

The method used in this study is the Non-Factorial Complete Randomized Design (RAL) method tested and consists of 5 treatments using fattening hormone (H) and consists of 4 repeats (r)

The treatments tested for hormones are:

Ho = Control
H1 = Neobro
H2 = Banana weevils
H3 = Bean sprout
H4 = Sweet potato shoots

Research Implementation

Procedure Hormones from Plants

Before the research began, hormone intake was first carried out from each plant, to produce different messing hormones, by:

Ingredients

1. Three types of plant materials (banana weevils, bean sprouts, and sweet potato shoots)

 ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

producing hormones each 0.5kg
2. Bioactivato EM4 0.25%
3. Molases 1%

Procedure:

Banana weevils and sweet potato shoots are each crushed or chopped until smooth as much as 0.5 kg and added 1 liter of water, then stirred and added EM4 2.5 ml and molasses or sugar drops 7.5 ml for one preparation. Then stir until evenly put in a closed bucket and stored for 1 week in a room free of sunlight and other disturbing organisms, close tightly for 7-14 days. On the eighth day, the hormone can be used as a drinking water mixture in each treatment, except Touge (the next day can be used.

Preparation of cages and plots

In a closed cage, plots are made plots for the place of treatment and repetition in the study. The plot in a cage measuring 80 x 80 cm as much as 5 heads/plot Making plots made of plywood with bones with 1 x 2 inches of wood.

Feeding and Drinking

Before the chicks are placed on the treatment plot for 7 days, they are locked in one place equipped with heating lamps and fed and drink moderately, accompanied by the administration of vaccines. After 7 days it is transferred into each plot, with 5 chicks/plot, each plot is prepared right feed and drink and given feed and water according to treatment.

Observation parameters
Production Cost
Production costs are calculated by the formula
TC= FC + VC
Where : TC = TotalCost,
FC = Fixed Cost and,
VC = Variable Cost (non-fixed cost), Build Wilson (2012).

Ravenue

Revenue is the result of multiplying between the number of chickens sold and the unit price of chickens (price per head). Alyari (1987) describes acceptance with the following formula: R = p x Q
Description R = Total Revenue
p = Production price (Rp per chicken)
Q = Total Production of chickens (heads per production period)
The calculation of the R/C ratio is carried out by the following formula (Gittinger, 1996):
R/C Ratio = TR/TC,
where:
R/C: Scales of Receipts and Costs,
TR: Total Revenue and:
TC: Total Cost,
Criteria:
If R/C < 1 then the business is said to be a loss.

If the R/C > 1 then the business is said to be profitable
If R/C = 1 then the business is said to break even (no profit and no loss)
Income over feed cost (IOFC)

Income over feed cost (IOFC) is income on feed costs which is livestock business revenue compared to ration costs (Fandy Tjiptono, 2011) with IOFC value = (Body weight x price) – (ration consumption x ration price).

RESULTS AND DISCUSSION

Production Cost

Production costs are all expenses made to obtain production factors from several types of hormone sources derived from plants after analysis an unreal difference ($p > 0.05$) can be in Table 1.

Table 1 shows from the analysis results that the use of plant hormones shows no real difference ($p>0.05$) but yam shoots (H4) have the lowest production costs with an average of Rp25084.75 followed by banana weevil plants (H2) an average of Rp29641.25, while treatment without hormones (H0) is the highest production cost with an average of Rp30520.00, but in the five treatments show no real difference. Table 1. The average cost of broiler chicken production from the influence of several plant hormones

plant hormones

Treatment	Average	Notation 5%
H_0 (kontrol)	30520.00	a
H_1 (Komersil)	30670.00	a
H_2 (banana weevil)	29641.25	a
H_3 (Bean Sprouts)	30524.25	a
H_4 (Sweet potato shoots)	25084.75	a

Note: The average value issued by the same letter means that it is not significantly different at $p \geq 0.05$

The results of research by Desriana and Doni Saat (2019) that ration / additional costs are the largest costs in livestock business, which reaches 60-70% of all production costs. Ration costs can be reduced by using alternative feed ingredients that have high value, relatively cheap prices, are easily available, and are safe for consumption by livestock. This is because plants are easy to find at no cost once they can reduce feed consumption by increasing the consumption of drinking water mixed with plant hormones that have been mixed with certain hormones. The income received by farmers is determined by the size of the costs used in the production process, and the analysis of the effect of the amount of production costs on income in a farm business (Penggu *et al*, 2014).

This is supported by Altahat, *et al* (2012), that the greater the costs incurred in the production of a business, it will affect the high selling price of products and the profits obtained. Factors that can affect production costs, especially broiler production are the number of seedlings, the amount of feed, the amount of medicines, chaff, electricity, labor, machinery, equipment maintenance costs, cages, and other unexpected costs (Altahat, et al, *2012*; Wuryanto, Ichwani and Kadarso, 2015).

According to Wuryanto, Ichwani, and Kadarso (2015), production factors that have a

real influence on the broiler business are seeds, cages, and feed. Widya, et al (2000) stated that in animal husbandry the cost of rations is the largest production cost, where the cost of this ration reaches 60-70% of all production costs. In broiler farms, the rations given are usually factory-made commercial rations which are quite expensive. To be able to reduce the price of this ration, alternative sources of feed ingredients are needed that have high value, relatively cheap prices, are easily available and are safe for consumption by livestock. Alternative feed ingredients that do not compete with human needs.

Total Revenue

Total revenue receipts are the total number of recipients from the sale of broiler livestock production with the results of the analysis showing a very real difference ($p < 0.01$) from the effect of giving different plant hormones through drinking water. The average results of total receipts obtained can be seen in Table 2.

Table 2. Average total revenue raising broiler chickens from the influence of several sources Plant hormones in Rp (rupiah/head)

Treatment		Average	Notation
H_0 (control)		31879.50	d C
H_1 (Neobro)		39615.75	bc AB
H_2 (banana weevil)		45090.00	a A
H_3 (bean sprout)		38468.25	c B
H_4 (sweet potato shots)		43767.00	ab A

Note: The average value issued by different letters means significantly different at p ≥0,01

Table 2 shows that the use of plant hormones from banana weevils (H2) is the highest total revenue with an average of Rp. 45090.00, no significant ($p>0.5$) with sweet potato shoots (H4) with an average total of Rp. 43767.00 but significantly different ($p <05$) from the use of hormones from bean sprouts (H3) and the use of Neubro (H1). The lowest total revenue was obtained in Ho treatment (Control) or given only plain drinking water.
The lowest total revenue was obtained in Po treatment (Control) or only given ordinary drinking water and based on fingerprint analysis was very significantly different ($P< 0.5$) against other treatments (additional hormones through drinking water). In general, broiler chickens prefer and receive feed that is wet or contains greater water content than dry feed (Scott, 2002). Feeding with more water content can increase body weight and daily broiler feed consumption, which can affect and cause some impact on the feed conversion rate (Afsharmanesh, Lotfi, and Mehdipour, 2016; Scott and Silversides, 2003).

Profit and Loss Analysis

Profit or loss is the end result of each livestock business, the average result and the results of fingerprint analysis obtained from the provision of different types of hormones from plants are very real ($p <0.01$) on profit or profit. The real difference in profit or profit can be seen in Table 3. From the calculation results based on the formula (Murib, et al. 2014).

Table 3. Average Profit and loss of raising broiler chickens from the influence of several

sources Plant hormones in thousand rupiah/head

Treatment	Average	Notation
H_0 (kontrol)	2.06	c C
H_1 (Neobro)	9.72	bc AB
H_2 (banana weevil)	16.45	ab AB
H_3 (bean sprout)	8.96	bc B
H_4 (sweet potato shots)	19.68	a A

Note; The notation of the same letter in the same column differs markedly at the level of 5% lowercase and differs markedly in uppercase (1%)

Table 3 shows the results that the use of plant hormones from sweet potato shoots (H4) is the result with the greatest benefit with an average of Rp19680 / head different intangible (P>0.5) with the use of banana weevil hormone (H2) on average Rp16450 / head but significantly different from the treatment of H3, P1, and P0. When viewed from the control treatment (H0) with an average profit of Rp2060 / head, and shows a very real difference ($p < 0.01$) from the treatment with treatment (H4>H2 >H1 >H3). So to get a good profit in raising broiler chickens, it is very good to use the help of hormones from yam shoots (P4) or banana weevils (P2).

These constraints can arise in terms of production including the environment and disease. In terms of price including feeding prices and prices of harvested chickens, and terms of society including business competition. These obstacles can be overcome by implementing appropriate risk management. According to the Agriculture and Forestry Service (2005), poultry commodities have good market prospects because they are supported by the characteristics of poultry that can be accepted by the Indonesian people who are mostly Muslims, the price is relatively cheap with easy access to obtain because it is already a public good.

R/C Ratio Analysis

The results of the data that have been analyzed bring the R/C Ratio (Revenue Cost Ratio) from the comparison between (Revenue) and costs (Cost) that have been calculated at the present value. According to Soekartawi (2003), the R/C ratio is the ratio between revenue and cost. Based on the results of the analysis show a real difference ($p < 0.05$) from the effect of giving different plant hormones, and more details can be seen in Table 4**.** The average R/C value of the results of the study was obtained significantly different ($p < 0.05$) against the administration of types of hormones from plants. Table 4 shows that the use of plant hormones from sweet potato shoots (H4) is the highest R/C value with an average of 1.91, different intangible (P>0.05) with the use of hormones from banana weevils (H2) averaging 1.52, but significantly different (P<0.05) with H3, H1 and H0 treatment.

Table 4. Average analysis of the R/C ratio of broiler breeding from the influence of several

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

sources Plant hormones

Treatment	Average	Notation
H0 (kontrol)	1.04	b
H1 (Neobro)	1.29	b
H2 (banana weevil)	1.52	ab
H3 (bean sprout)	1.26	b
H4 (sweet potato shots)	1.91	a

Note; The notation of the same letter in the same column differs markedly at the level of 5%

When viewed from the control treatment (H0) with an average R/C profit of 1.04 is the lowest value and shows a real difference ($p < 0.05$) from the P4 treatment but not significantly different from the H3<H1<HP2 treatment. To get a good R/C ratio in raising good broiler chickens by using drinking water with additional hormones from yam shoots (H4) or banana weevils (H2).

Menurut Rinto, dkk., (2018) menyatakan bahwa Nilai R/C < 1 maka kegiatan usaha peternakan yang dilakukan dapat dikatakan tidak layak karena kegiatan usaha yang dilakukan tidak dapat memberikan penerimaan yang lebih besar dari pada pengeluarannya. Nilai R/C = 1 maka kegiatan usaha peternakan yang dilakukan dapat dikatakan tidak memberikan keuntungan maupun kerugian (impas) karena penerimaan yang diterima akan sama dengan pengeluaran yang dikeluarkan.

From the research that has been done, an R/C ratio of 1.35 is obtained which shows that the broiler chicken business is feasible and can be continued, with the development of the size of the business scale and the number of poultry to be farmed. This is supported by research conducted by Wuryanto, Ichwani, and Kadarso (2015) on the broiler farming business in Sleman Regency with an R/C Ratio of 1.2 with a production capacity of 2725 broilers.

***Income over feed cost* (IOFC)**

The calculation of the value of Income over feed cost (IOFC) is income on feed costs for livestock business revenues with ration costs (Fandy Tjiptono, 2011) and after analysis shows a very real difference ($p < 0.01$) and for more details the average of IOFC can be seen in Table 5.

Table 5. Average income over feed cost (IOFC) of raising broiler chickens from the influence of Some Sources of Plant Hormones

Treatment	Average	Notation
H0 (kontrol)	15160	c C
H1 (Neobro)	22896	b B
H2 (banana weevil)	29849	a A
H3 (bean sprout)	22369	b B
H4 (sweet potato shots)	29383	a A

Keterangan; Notasi huruf kecil yang berbeda pada kolom yang sama berbeda nyata pada taraf 5% dan notasi huruf besar yang berbeda pada kolom yang sama berbeda sangat nyata pada (1%)

The results of the IOFC calculation on average the results of the analysis were

obtained very real different ($p < 0.01$) it was explained that the use of plant hormones from banana weevils (H2) was the highest IOFC value with an average of Rp 29849 followed and was not significantly different from the use of hormones from sweet potato shoots (H4) on average Rp 293833 but very significantly different from H3 treatment, H1, and H0. When viewed from the control treatment (H0), with IOFC only an average of Rp 115160 is the lowest IOFC by showing a real difference ($p < 0.01$ H3<H1<H4<H2.

So to get a good IOFC in raising broiler chickens one must use drinking water-added hormones from yam shoots (P4) or banana weevils (P2). IOFC in this study had no real effect allegedly due to weight gain and feed consumption which marked the main parameters of IOFC calculation, also relatively the same. By the opinion of Wahyu (2004), states that IOFC is strongly influenced by ration consumption, final weight, ration price, and chicken selling price

CONCLUSION

The effect of giving hormones to some plants as a mixture of drinking water has a significant effect on total revenue, total profit and loss, R/C ratio analysis, and IOFC with the best hormones from banana weevils (H2 and sweet potato shoots (H4).

REFERENCES

[1] Altahat, E., A. AL-Sharafat danM.Altarawneh. 2012. Factors Affecting Profitability of Layer Hens Enterprises. American Journal of Agricultural and Biological Sciences,7 (1): 106-113.
[2] Asra, R. 2014. Pengaruh Hormon Giberelin (GA3) Terhadap Daya Kecambah dan Vigoritas Calopoganium caerulium. Biospesies.i7 1:29-33
[3] Astuti dan Y. Amilah, 2006. Pengaruh Konsentrasi Ekstrak Taoge dan Kacang Hijau pada Media Vacin dan Went (VW) terhadap Pertumbuhan Kecambah Anggrek Bulan (Phalaenopsis amabilis L.). Buletin Penelitian No. 09.
[4] Bahtiar *et al*. 2016. Pemanfaatan Kompos Bonggol Pisang (Musa acuminate) Untuk Meningkatkan Pertumbuhan dan Kandungan Gula Tanaman Jagung Manis (Zea mays L. Saccharata), Jurnal Ilmu Pertanian Agritrop14(1),18-22.
[5] Bangun, Wilson. 2012. "Manajemen Sumber Daya Manusia". Jakarta: Erlangga.
[6] Bindels,L.B., N. Delzeme, P. Cani, dan J.. Walter. Towards a more Coprehensive soncept for prebiotics . Nat. Rev. Gastrol. Hepatol 12: 303- 310.
[7] Budiansyah, 2004. Pemanfaata probiotik dalam meningkatrnterol. penampilan Produksi ternak unggas. Prog. Pasca Sarjana Institut Pertanian Bogor.
[8] Castanon, J.I.R. 2007. History of the use of antibiotic as growth promotors in European poultry feeds feed. J Poult Sci. 86: 2466-2471.
[9] Diana, Novita, S. Surti Kurniasih, dan R. Teti Rostikawati. 2012. Pengaruh Pemberian Mikroorganisme Lokal (MOL) Bonggol Pisang Nangka terhadap Produksi Rosella. Fakultas Keguruan dan Ilmu Pendidikan Universitas Pakuan Bogor.
[10] Desriana Maya Sari Tarigan, Doni Sahat Tua Manalu' 2019. *Azolla pinnata* Segar Sebagai Pakan Alternatif Untuk Mengurangi Biaya Produksi Ayam Broiler. AGRISEP Vol. 18No. 1Maret 2019Hal: 177–186| 17.
[11] Ensminger, M.E., C.G. S. C. Scanes, G. Brant. 2004. Poultry Scince. 4 th Edition Pearson

Prentice Hall. New Jersey.
[12] Gittinger. 1996. Analisa Ekonomi Proyek proyek Pertanian. UI-Press. Jakarta.
[13] Handayani, I. 1999. Pengaruh Pemberian Sitokinin dan Triakontanol Pada Pertumbuhan Manggis (Garcinia mangostana L.) Hasil Penyambungan. [Skripsi]. Jurusan Budidaya Pertanian. Fakultas Pertanian. Institut Pertanian Bogor. 53 hal.
[14] Javanmardi, J., C. Stushnoff, E. Locke, and J.M. Vivanco. 2003. Antioxidant Activity and Total henolic content of Iranian Ocimum accessions. Food Chemistry 83:547-550.
[15] Juanda. D dan C. Bambang. 1995. Ubi Jalar, Budidaya Ubi Jalar, dan Analisis Usaha Tani Kanisius. Yogyakarta.
[16] Kataren PP. 2010. Kebutuhan Gizi Ternak Unggas di Indonesia. Wartazoa. 20:172-1180.
[17] Lestari, Wahyu Puji (2018). *Pengaruh Pemanfaatan Tepung Bonggol Pisang Dalam Pakan Terhadap Penampilan Produksi Ayam Pedaging. Sarjana thesis, Universitas Brawijaya*.
[18] Mulyantini, N. G. A. 2011. Produksi Ternak Unggas. Institut Pertanian Bogor Press. Bogor.
[19] Murtidjo, B.A. 2003. Pemotongan dan Penanganan Daging Ayam. Kanisius. Yogyakarta.
[20] Murib, P. I, Kruniasih. Kadarso.2014. Analisis ekonomi usaha ayam peterlur di Farm Harma Banjarhajo Kecamatan Ngemplak, Saleman. Jurnal Fakultas Pertanian Universitas Janabadra Yogyakarta.16: 14-29.
[21] Nawawi, N.T. dan Nurrohmah. 2007. Ransum Ayam Broiler. PT Trubus Agrisarana, Surabaya.
[22] Rasyaf, M. 2008. Panduan Beternak Ayam Pedaging. Penebar Swadaya. Jakarta.
[23] Rinto, R., Santoso, S. I., & Muryani, R. (2018). Analisis Komputasi Pendapatan Break Even Point (BEP) dan R/C Ratio Peternakan Ayam Petelur Rencang Gesang Farm di Desa Janggleng Kecamatan Kaloran Kabupaten Temanggung. MEDIAGRO, 13(2).
[24] Robi Dan Nur Hidayat, 2014. *Pemanfaatan Ekstrak Tauge Kacang Hijau (Phaseolus radiatus) Sebagai Pupuk Untuk Meningkatkan Populasi Spirulina sp. Skripsi thesis, Universitas Airlangga.*
[25] Sarwono B. 2007. Beternak Ayam Buras Pedaging dan Petelur Edisi Revisi. penebar Swadaya, Jakarta
[26] Scanes, C. G., G Brant, dan M. E., Ensminger. 2004. Poultry Science. Edisi 4. Person education Inc, New Jersey.
[27] Scott, T. A. 2002. Impact of wet feeding wheat-based diets with or without enzyme on broiler chick performance. Canadian Journal Animal Science, 82 (3): 409-417.
[28] Scott, T. A. dan F.G., Silversides. 2003. Defining the effects of wheat type, water inclusion level, and wet-diet restriction on variability in performance of broilers fed wheat-based diets with added water. Canadian Journal Animal Science, 83 (2): 265-272.
[29] Soekartawi.2015. Analisis Usahatani.Universitas Indonesia.Yogyakarta.
[30] Supriatna, I., I.B. Hismayasari, I.G.A. Bidiadnyani, M. Sayuti dan A. Yani. 2016.Analisis Karakteristik Bakteri Probiotik. Jurnal Airaha. 5(2): 130-132.
[31] Ulupi, N, I.R.H. Soesanto, S.K. Inayah. 2015. Performa Ayam Broiler dengan

Pemberian Serbuk Pinang sebagai *Feed Aditive.* Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan. Vol. 03 No. 1, hal 8 - 11.

[32] Wardah, T., E. B. Sopandi, H. Aksono dan Kusriningrum. 2012. Reduction of intracellular lipid accumulation serum leptin and cholesterol of levels in broiler fed diet supplemented with powder leaves of phyllanthus buxitolius. Asian J. Agric. Res. 6(3): 106-117.

[33] Wahju, J. 2004. Ilmu Nutrisi Unggas, Cetakan ke-V. Gadjah Mada University Yogyakarta.

[34] Wibowo, R.Y., J. Riyanto dan Y.B.P Subagyo. 2014. Pengaruh penggunaan ampas teh (camellia sinensis) dalam ransum terhadap produksi karkas kelinci New Zealand White jantan. J. Biofarmasi. 12(1): 11-17.

[35] Widodo, W. 2008. Nutrisi dan Pakan Unggas Kontekstual. Universitas Muhammadiyah Malang, Malang.

[36] Young, L. L., Northcutt, J. K., Buhr, R. J., Lyon, C. E. and Ware. G. O., 2001. Effects of Age, Sex and Duration of Postmortem Aging on Percentage Yield of Parts From Broiler Chicken Carcass. Poultry Sci 80 (3). Hlm: 376-379

[37] Ulfa. 2014. Peran Senyawa Bioaktif Tanaman Sebagai Zat Pengatur Tumbuh dalam Memacu Produksi Umbi Mini Kentang *Solanum tuberosum L.* Pada sistem budidaya Aeroponik. Makasar: Universitas Hasanuddin.

[38] Wibowo, A. 2010. Pengaruh Waktu Aplikasi dan Pemberian Berbagai Dosis Kompos Azolla Terhadap Pertumbuhan dan Produksi Tanaman kedelai (Glycine max (L) Merrill). Skripsi Fakultas Pertanian. Universitas Sumatera Utara: Medan.

[39] Widya, dkk. 2010. Pemanfaatan Azolla pinnata sebagai Campuran Ransum Untuk Meningkatkan Performa Ayam Broiler. Politeknik Pertanian Payakumbuh Press.

[40] Wuryanto, D., Ichwani dan Kadarso. 2015. Analisis produksi usaha peternakan ayam pedaging di Kabupaten Sleman. Jurnal PertanianAgros,17 (1): 71-80.

 ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)