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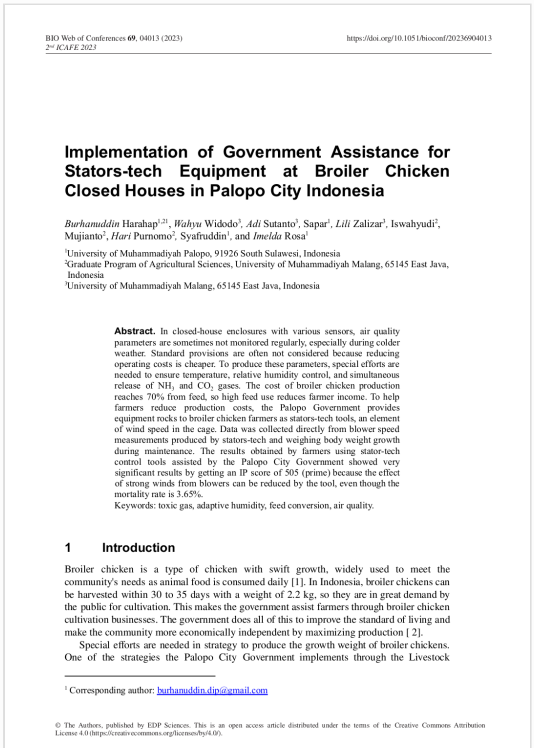

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Implementation of Government Assistance for Stators-tech Equipment at Broiler Chicken Closed Houses in Palopo City Indonesia

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Abstract. In closed-house enclosures with various sensors, air quality parameters are sometimes not monitored regularly, especially during colder weather. Standard provisions are often not considered because reducing operating costs is cheaper. To produce these parameters, special efforts are needed to ensure temperature, relative humidity control, and simultaneous release of NH_3 and CO_2 gases. The cost of broiler chicken production reaches 70% from feed, so high feed use reduces farmer income. To help farmers reduce production costs, the Palopo Government provides equipment rocks to broiler chicken farmers as stators-tech tools, an element of wind speed in the cage. Data was collected directly from blower speed measurements produced by stators-tech and weighing body weight growth during maintenance. The results obtained by farmers using stator-tech control tools assisted by the Palopo City Government showed very significant results by getting an IP score of 505 (prime) because the effect of strong winds from blowers can be reduced by the tool, even though the mortality rate is 3.65%.
Keywords: toxic gas, adaptive humidity, feed conversion, air quality.

1 Introduction

Broiler chicken is a type of chicken with swift growth, widely used to meet the community's needs as animal food is consumed daily [1]. In Indonesia, broiler chickens can be harvested within 30 to 35 days with a weight of 2.2 kg, so they are in great demand by the public for cultivation. This makes the government assist farmers through broiler chicken cultivation businesses. The government does all of this to improve the standard of living and make the community more economically independent by maximizing production [2].

Special efforts are needed in strategy to produce the growth weight of broiler chickens. One of the strategies the Palopo City Government implements through the Livestock

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1 Introduction

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Department is simultaneously controlling temperature, relative humidity, toxic gas (NH3, CO2), and wind speeds generated from closed-house fans. In addition, providing nutritious feed, ambient temperature, and optimal maintenance also ensures high production yields. [3], [4].

Broiler chickens' productivity and growth results are much influenced by ambient temperature, feed, water density, and adequacy [5][6]. Its health and growth can be affected by the air quality in the enclosure [7]–[9]. The remains of the dirt will affect the air quality. The manure will produce ammonia gas in the kendang, which is hazardous for broiler chickens' growth and performance. The safe ammonia gas content in the chicken coop is 5 🅰 10-6 to 25 🅰 10-6. If their number is more than 25 🅰 10-6), it is dangerous for the health of broiler chickens. If ammonia levels of 30 🅰 10-6 are detrimental to the general health of chickens. Suppose ammonia gas reaches 40 🅰 10-6 to 50 🅰10-6 it reduces growth by 15% in broiler chickens [10].

With the advancement and development of modern technologies, broiler chicken coops, nonlinear adaptive temperature, and humidity control can be organized. At present, the design of the blower control panel in the closed house enclosure system only relies on ON / OFF because it is easy and not complicated to apply because it is straightforward [11][12][4]. In closed-house (CH) control enclosures with ventilation automation systems, requirements such as temperature, humidity, and airspeed are regulated to minimize the disruption of very drastic temperature changes [13]. To maximize the regulation of broiler chicken needs, comfortable and excellent room conditions and removing harmful CO, CO2, and NH3 gases in the cage are needed [14][15].

In CH enclosures with a wide variety of sensors used, air quality parameters are sometimes not monitored regularly, especially during colder weather, and standard provisions are often not considered due to reducing cheaper operational costs. Therefore enclosure monitoring and analysis systems must be integrated to improve production performance and to help reduce cost burdens [16]. Researchers can use a fuzzy digital system to control critical parameters such as temperature, relative humidity, CO2, and NH3 inside the CH cage with high precision. [17][18].

Poor management of air ventilation systems can result in excessive indoor temperature and humidity levels. It can reduce productivity and growth, resulting in severe consequences such as lower feed conversion, excessive energy expenditure, and high mortality [19][20]. With high feed conversion, where production costs reach 70 % from feed, so high feed use will reduce farmers' income [21].

2 Research methods

This study was conducted using a descriptive analysis method for three indicators of success rate parameters for broiler poultry farms using feed conversion rate (FCR), performance index (PI), and profit analysis [22]. Data collection was carried out by measuring the speed of the blower every day during the maintenance period using a Kestrel 3000 brand anemometer, and the growth weight was weighed starting from one day old or DOC (Day Old Chicks) to harvest age on day 34. Data recording of feed usage during maintenance is also taken as material for comparison

This research was conducted in CH cages in Palopo City, South Sulawesi, Indonesia. On behalf of Mr. X, Breeders receive government rocks as Stators-tech control panel tools with a population of 14,600 heads. Data collection was carried out by literature study and collected data by measuring blower speed and weighing body weight growth during

maintenance. Then the data was processed using EXEL Microsof statistical analysis to see the effect on growth and performance during maintenance.

2.1 Feed conversion rate (FCR)

The conversion of the feed consumed by chickens to obtain one kilogram of the live weight of chickens is called FCR [23]. The FCR value is a calculation of the efficiency level of the use of feed consumed by the chicken's body. The lower the feed conversion value, the more efficiently broilers convert feed into meat [24]. The following formula is used to calculate FCR:

$$FCR = \frac{Daily\ feed\ consumption\ (kg)}{Daily\ weight\ gain(kg)} \quad (1)$$

2.2 Performance index (PI)

PI indicates healthy results obtained in maintenance mode by calculating live chicken percentage, weight, mean harvest age, and FCR [25][22]. PI is calculated in the way:

$$PI = \frac{Live\ chickens\ (\%)\ x\ Average\ weight\ (kg)}{FCR \times Average\ age\ \ 100\ \%} \quad (2)$$

2.3 Profit analysis

An analysis of the gains a grower can make by adjusting the fan speed can be calculated as follows: [6][22]:

$$Adventage\ or\ loss = input - output \quad (3)$$

3 Result and discussion

In the maintenance of broiler chicken cultivation business using the CH kendang system, a complex and often unavoidable problem is the emergence of solid wind peek that cannot be controlled due to speed that does not synergize with the temperature of chicken needs and humidity [26]. Problems arise if the temperature of the chicken is met. Still, the speed of the blower and moisture are inappropriate, resulting in disturbed chicken comfort, and the chicken will not consume feed according to the daily target [27]. The fan speed setting should be adjusted according to the age and weight of the chicken. Each level of fan speed calculation affects the difference between the temperature displayed on the thermometer and the actual temperature felt by the chickens [28]. The effect of fan speed aging on temperature differential is shown in Table 1.

Table 1. Effect of fan speed by age on temperature differential [29]

Wind Speed (m/s)	**4 to 7 (weeks)**	**Adult**
	°C	°C
0.25	0.3	
0.51	0.5	0.2
0.76	2.4	0.8
1.02	3.6	1.3

1.27	4.4	2.2
1.53	4.6	2.8
1.78	5	3
2.03	5.6	3.3
2.29	5.8	3.6
2.54	5.8	3.9

According to [30], the blower speed problem in the CH enclosure is the loss of the effects of strong winds. This strong wind suddenly appears due to the speed of the blower, which is active for a certain period and only periodically regulated based on age and body weight. This setting is done manually ON / OFF or called intermittent. Using the Stators-tech control panel, the blower speed is constantly adjusted according to the needs of temperature and chicken weight so as not to cause the effect of strong winds that appear suddenly when the blower is on. The results of fan speed and weight measurements over 34 days are shown in Table 2.

Table 2. The fan speed and chassis weight results

DAY	DATE	DEAD (tail)	BW STR (gr)*	ABW AKTUAL (gr)	SPEED FAN m/s				
					T1	T2	T3	T4	T5
1	15-Mar	36	60	77,6	0	0	0	0	0,6
2	16-Mar	22	75	96,5	0	0	0	0	0,8
3	17-Mar	43	95	120,7	0	0	0	0	0,8
4	18-Mar	21	119	148	0	0	0	0	0,9
5	19-Mar	83	146	178,9	0	0,6	0,4	0,4	1,4
6	20-Mar	26	177	218,8	0	0,3	0,4	0,4	1
7	21-Mar	21	212	252,8	0	0,4	0,5	0,5	1,00
8	22-Mar	21	254	301,1	0	0,4	0,5	0,5	1,40
9	23-Mar	26	300	345,6	0	0,5	0,5	0,6	1,50
10	24-Mar	28	347	396,4	1,5	1,5	1,3	1,4	1,80
11	25-Mar	26	395	414	1,2	0,9	0,6	1,1	2,20
12	26-Mar	34	450	528,2	0,8	1,1	1	0,9	2,20
13	27-Mar	12	505	584,1	1,6	1,7	1,7	1,5	2,50
14	28-Mar	10	565	658,49	1,8	2,2	2,3	2,3	3,20
15	29-Mar	6	630	720,6	1,9	2	2	2	3,30
16	30-Mar	12	700	801,5	1,7	1,8	1,9	2	2,80
17	31-Mar	9	770	878,98	2,3	2,1	2,1	2,2	3,30

18	01-Apr	8	840	948,86	2,1	2,1	2,2	2,5	3,30
19	02-Apr	0	920	985,6	2,1	2,1	2,1	2,1	3,40
20	03-Apr	5	1000	1108,25	2,1	2,2	2,2	2,2	3,40
21	04-Apr	4	1080	1284,2	2,2	2,2	2,2	2,3	3,40
22	05-Apr	1	1160	1352	2,1	2,2	2,2	2,1	3,40
23	06-Apr	13	1240	1461,24	2,1	2,2	2,2	2,1	3,40
24	07-Apr	10	1330	1545,3	2,1	2,2	2,2	2,1	3,40
25	08-Apr	8	1420	1629,75	2,1	2,2	2,2	2,1	3,40
26	09-Apr	0	1510	1746,59	2,2	2,2	2,5	26	3,40
27	10-Apr	6	1600	1845,98	2,1	2,2	2,2	2,1	3,40
28	11-Apr	5	1700	2172,16	2,1	2,2	2,2	2,1	3,40
29	12-Apr	12	1800	2250,54	2,1	2,2	2,2	2,1	3,40
30	13-Apr	10	1910	2370,28	2,1	2,2	2,2	2,1	3,40
31	14-Apr	5	2020	2480,98	2,1	2,2	2,2	2,1	3,40
32	15-Apr	10	2130	2689,51	2,1	2,2	2,2	2,1	3,40
33	16-Apr	0	2230	2710,3	2,1	2,2	2,2	2,1	3,40
34	17-Apr	0	2330	2990,58	2,1	2,2	2,2	2,1	3,40

Description: * Standard Body Weight (gr) PT. JASS Indonesia

3.1 Feed conversion ratio (FCR)

Broiler weight gain values are shown in Table 2. Using this table, the percentage of chicken gain at 1-34 days was higher than the standard weight gain for standard chickens issued by PT. JASS, Indonesia. The rate of weight gain is relatively high and significant due to feed consumption and its conversion to meat weight at 1-30 days. The influence of wind speed produced by a blower is obtained due to that is stable and evenly distributed throughout the drum area due to the arrangement of Strato-tech panel control, which is controlled based on the level of age suitability and weight of the chicken. This result follows research conducted by [31] that the most substantial influence on chicken weight gain is feed consumption, which is influenced by the environment. Also, weight gain is closely related to feeding the right amount and food quality. Impaired feed intake slows growth and reduces crop weight [32]. FCR results for 30 days are shown in Table 3.

Table 3. FCR and PI maintenance results from over 30 days

Daily feed (gr)	BW actual (gr)	FCR	PI
14	77,6	0,180412	1.115.569
20	96,5	0,207254	1.437.665
26	120,7	0,21541	2.003.221
31	148	0,209459	2.872.773
36	178,9	0,20123	4.032.133
41	218,8	0,187386	5.975.687
46	252,8	0,181962	7.918.863
52	301,1	0,1727	10.778.569
58	345,6	0,167824	13.716.457
63	396,4	0,15893	17.799.673
68	414	0,164251	18.938.826
73	528,2	0,138205	30.136.433
77	584,1	0,131827	37.063.652
81	658,49	0,123009	47.349.444
86	720,6	0,119345	56.316.776
91	801,5	0,113537	69.214.322
96	878,98	0,109218	83.541.755
101	948,86	0,106444	99.395.894
107	985,6	0,108563	110.911.315
115	1108,25	0,103767	142.853.538
126	1284,2	0,098116	192.774.627
138	1352	0,102071	210.474.237
152	1461,24	0,104021	236.608.459
164	1545,3	0,106128	257.754.914
174	1629,75	0,106765	281.853.450
183	1746,59	0,104776	319.075.381
191	1845,98	0,103468	351.692.720
198	2172,16	0,091154	478.784.871
204	2250,54	0,090645	505.608.911

3.2 Performance index (PI)

The number of deaths combined with culling by the lethality of chickens in one cycle production names depletion, according to percentages calculated, while the Production Index is a way of calculating to determine the performance of broiler chicken rearing. The

higher the obtained IP value, the better the chicken performance and the more efficient the feed conversion. The depletion rate and production index are shown in Table 3. Based on chicken feed intake, weight gain, body weight, and feed conversion efficiency values, the chickens achieve their target performance every day from 1 to 34 years of age, with 3.65 % deaths, which is very high. Still, it has not yet reached a less than 5% standard. [33].

3.3 Profit analysis

Based on the data in Table 1, adjusting the fan speed to 34-day-old (harvest) chickens using the Stators-Tech tool shows a higher production index (prime) than PT. JASS Indonesian standard published. If the IP obtained value, the chickens' performance was better, and the feed consumption was more efficient. The chicken production process is successful if the IP value shows how mortality, FCR, body weight, and harvest age are affected. [34][29][32] states that production standard index values are <300 (poor), 301-325 (sufficient), 326-350 (good), 351-400 (very good), and >400 (very good) while obtaining the results using Stators-tech tools are 505 (excellent).

4 Conclusions

This study determined the air exchange rate efficiency of closed broiler cages using maximum and minimum ventilation methods using the Staters Tech tool. This improves temperature, air stability, and temperature and humidity stability within the enclosure. Things take a turn for the worse. That's why results matter weight gain in chicken growth performance with a growth rate of two to three days of standard target growth. Using this tool increases income for prime farmers because the IP results obtained are a score of 505, which is the best achievement (prime). The amount of Stators-tech equipment assistance to farmers so that public interest is higher for breeding must be a concern by the government to continue to increase.

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