

# An Utilization of Carrot Tuber Juice (*Daucus carota L.*) to Increase Average Daily Gain in Broiler Chickens: Reinventing Food Security through Chicken Livestock

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## Abstract

The business of raising broilers is one of the biggest contributors to meet people's needs for animal protein. About 70% of production costs are spent by feed. Carrots are one of the potential and multi-use horticultural commodities in livestock as a feed source. In this paper, the first variable that we will adopt is Average Daily Gain (ADG) in broiler chickens. Then the second variable is the juice of carrot tuber (*Daucus carota L.*). Responding to these problems, the authors propose an idea to find alternative feeds to enlarge ADG in broiler chickens. The procedure of the study is a 100 broiler chickens (since the age of 1 day) during the first week intensively maintained at the brooder cage. In the second week then divided into 5 groups, consisting of 1 control group and 4 treatment groups each replicating 20 chickens by randomization according to treatment. The conversion calculation of the dose of carrot administration is 17.5 ml/head/day.

**Keywords:** *alternative feed, average daily gain, carrot tuber, chicken broiler, juice.*

## 1. Introduction

To improve the human resources capacity, the energy and protein supplies must be enough in society in order to measure the success of the government in food, health, farm, and social-economic development (Moeloek, 1999). Furthermore, Irawan (2002) stated that food security degree of each individual could be determined by evaluating the energy and protein consumption value each day.

The idea of broiler farming is one of the biggest support to fulfill the demand of animal protein source. The broiler chicken is a genetic technology results of crossbreeding Cornish and Plymouth Rock chicken. It has economical characteristics such as grow faster than another breed, the low feed conversion, faster collection of carcass because of high growth rate, and the meat itself has tender fibers than another chicken breed (Murtidjo, 1987). Right now, there are many farms ranged from the small scale until large industrial scale are trying to produce a high-quality animal product. In the broiler industry, the feed is the largest component in total cost production approximately 70% of the total cost. Because of that, additional modifiers are needed to maximize the output of production and minimize the production cost. That is why feed additive is necessary to meet these conditions.

Carrot (*Daucus carota L.*) is a vegetable that categorized into a bushy plant, could grow in the dry season and wet season. The origin of this plant comes from subtropical climates. It has a life cycle around 12-24 months, has shorter stem and rich in carbohydrates in its tuber. Carrot is a potential horticulture commodity in public health aspect around the globe because it contains a lot of vitamins especially vitamin A that has remedy effect in most diseases because it promotes recovery of epithelium cells (Rukmana, 1995).

Carrot is rich in pro-vitamin A and carotenoid which gives the yellow color in most fruits and vegetables (*Referensi Sehat*, 2015). Carrot has a lot of dietary fiber, which commonly can be found in edible parts of vegetable and consist of indigestible carbohydrates which is resistant to the digestive process and fermented in most parts of the colon. Deddy Muchtadi (2001); Jansen Silalahi and Netty Hutagalung (2010), stated that dietary fiber is a food source that cannot be hydrolyzed by the digestive enzyme. Furthermore Anik Hermingsih (2010); stated that dietary fiber is a remnant part of plant cells including hemicellulose, cellulose, lignin, oligosaccharides, pectin, gum and cuticle (waxy layer). Meyer (2004) also stated that fiber is important to promote the health of the digestive tract and improve its function.

In this research, the first variable is Average Daily Gain from broiler chicken and second variable as a free variable is a carrot (*Daucus carota L.*) tuber juice as a feed additive. From these variables, there is a correlation that carrot tuber juice as feed additive could increase the Average Daily Gain (ADG) in the broiler.

## 2. Material And Methods

This study was conducted at the Faculty of Veterinary Medicine, Airlangga University. 100 broiler chickens since DOC (day old chicken) for 1 week maintained intensively in brooder cage. In the next week, divided into 5 groups, consist of 1 control group and 4 treatment group with 20 chicken repetition each group. All chicken is given with various feed type according to their phase of growth (starter 1-3 weeks old and finisher 4-5 weeks old) and the water sources are ad libitum.

The feed formulation we used in this research is according to Ardana (2009). The starter feed is given in 1-3 weeks old and consist of 22-24% protein, 2.5% fat, 4% crude fiber, 1% Calcium (Ca), and 0.7-0.9% Phosphor (P) with given dose; 1st week 17gram/chicken/day, 2nd week 43gram/chicken/day, and 3rd week 66 gram/chicken/day with total dose for three weeks is 882 gram. The finisher feed are given in 4-5 weeks old and consist of 18,1-21,2% protein, 2.5% fat, 4.5% crude fiber, 1% Calcium (Ca) and 0.7-0.9% Phosphor (P) with given dose; 4th week 91 gram/chicken/day, and 5th week 111gram/chicken/day.

In this research, the carrot juices are given to all treatment group with different dose each treatment. The dose for each treatment group are listed below;

1. Control (K) group didn't get the carrot juice
2. Treatment group 1 (T1) given with 8.25ml/chicken/day (half dose)
3. Treatment group 2 (T2) given with 17.5ml/chicken/day (1x dose)
4. Treatment group 3 (T3) given with 35ml/chicken/day (2x dose)
5. Treatment group 4 (T4) given with 52.5ml/chicken/day (3x dose)

The juice was combined with the drinking water and given adequately every day. Measuring the weight of chickens did every week in 50% sample each group, and then divided by 7 to know the average daily gain (ADG) the broiler chicken every week.

## 3. Results And Discussion

The beneficial dietary fiber in carrot promotes the digestive process in the digestive system thus increasing the efficiency in the digestion of feed and nutrition (Herminingsih, 2010). Furthermore, Herminingsih (2010) stated that the most common dietary fiber in carrot is hemicellulose, cellulose, and lignin. This beneficial dietary fiber also helps to increase the average daily gain in the broiler.

The average daily gain results (g/chicken/week) of broiler chicken that given with carrot juice in this research for 5 weeks are listed in **table 1**. According to Qurniawan (2016), the average daily gain is affected by many factors including sex, breed, environment, feed quality, feed additive, and feed consumption. The better quality of these factors, the more Average Daily Gain results in breeding. In opposite, if these factors are in low quality, the growth of broiler will decrease and the impact is low in Average Daily Gain (ADG).

**Table 1. Average Daily Gain in Broiler with Carrot Tuber Juice Supplementation.**

ADG (g/chicken/week)	Control	T1	T2	T3	T4
2 <sup>nd</sup> week	319.4	323.7	289.2	313.5	316.2
3 <sup>rd</sup> week	513.8	507.5	502.5	505	507.5
4 <sup>th</sup> week	802.2	1018.7	1015.2	1010.5	1145.7
5 <sup>th</sup> week	1294.4	1571	1635.5	1752.4	1787.5

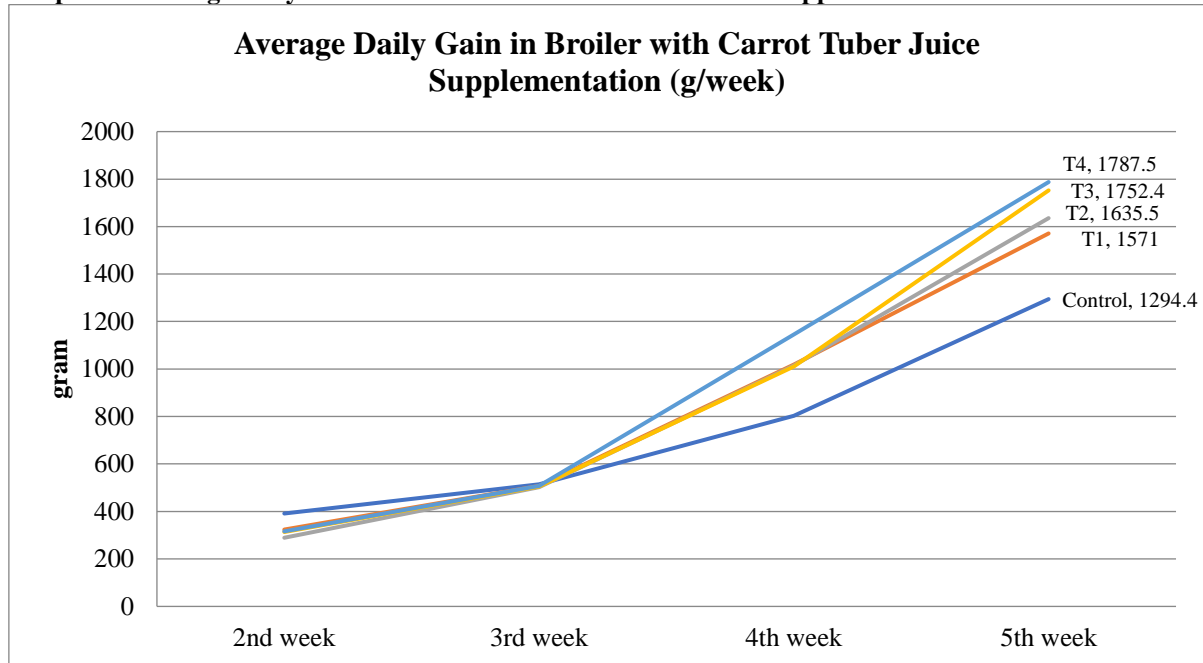
\*the results are significant (p>0.05)

In the fifth week after treatment by giving carrot juice to the broiler. The treatment group 4 (T4) with 52.5ml/chicken/day dose has the most biggest Average Daily Gain than another treatment group and control

(1787 g/chicken/week). T4 is bigger 1.34 times than the control group which is mean there is a rise in the average daily gain variable by supplementation of carrot juice.

In the third week, all the treatment has almost the same value, it is confirmed with almost same point in **graphic 1**. After that, the T4 (blue line) is rising most higher than other treatment group following by T3 (yellow line), T2 (gray line), T1 (orange line) and the least is control (light blue line) respectively.

**Graphic 1. Average Daily Gain in Broiler with Carrot Tuber Juice Supplementation.**



This data concludes that the supplementation of carrot tuber juice in broiler could increase the average daily gain in broiler chicken in the fifth weeks of breeding.

#### 4. Conclusion

According to this research, we can conclude that supplementation of carrot tuber juice (*Daucus carota L.*) could increase the average daily gain of broiler chicken with dose 52.5ml/chicken/day.

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