



UNIVERSITI PUTRA MALAYSIA

**PERFORMANCE OF TURKEY FED WITH DEHYDRATED FOOD WASTE
BASED RATIONS IN FREE RANGE AND CAGES SYSTEMS**

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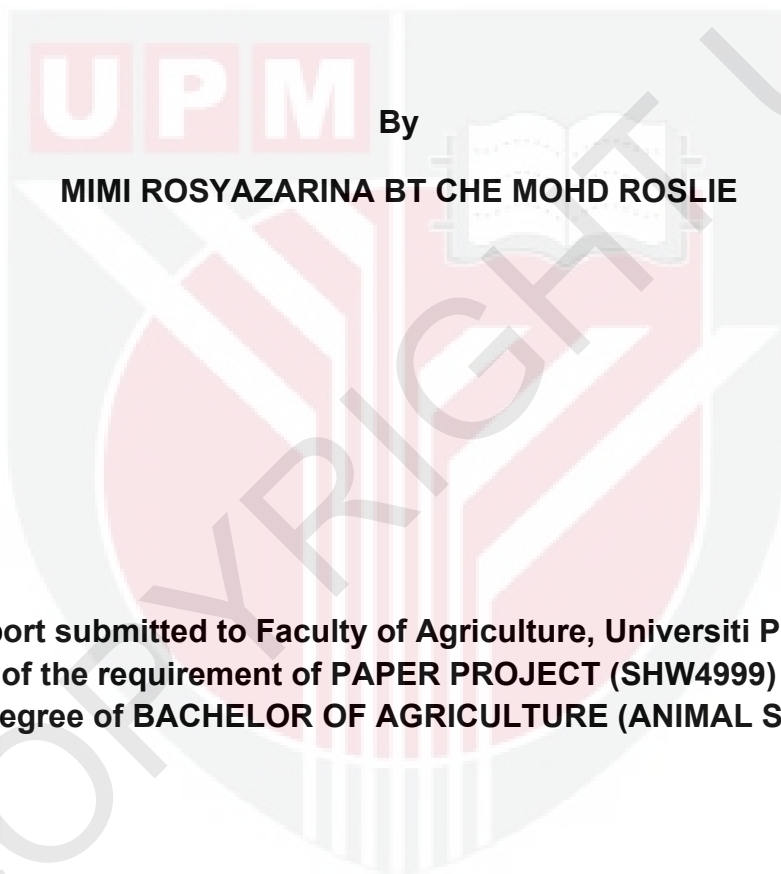
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Faculty of Agriculture

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**PERFORMANCE OF TURKEY FED WITH DEHYDRATED FOOD WASTE BASED
RATIONS IN FREE RANGE AND CAGES SYSTEMS**



By

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**A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia,
in fulfilment of the requirement of PAPER PROJECT (SHW4999) for the award
of the degree of BACHELOR OF AGRICULTURE (ANIMAL SCIENCE)**

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REPORT'S DECLARATION FORM

This project entitle Production, Performance Of Turkey Fed With Dehydrated Food Waste Based Rations In Free Range And Cages Systems is prepared by Mimi Rosyazarina Bt Che Mohd Roslie (165174) and submitted Faculty of Agriculture in fulfillment of the requirement of the paper project (SHW4999) for the award of the degree of Bachelor of Agriculture (Animal Science) .

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ABSTRACT

The title of this research is performance of turkey fed with dehydrated food waste based rations in free range and cages systems. The aim for this research is to evaluate the effect of dehydrated food waste on performance of turkey in free range system (FRS) and cages system (CS). The main objective of this study is to compare the performance of turkey reared under free range system and cages systems. The specific objectives are i) to evaluate the growth performance of turkey fed with dehydrated food waste based ration in free range and cages system, ii) to identify the flock behaviour of turkey fed with dehydrated food waste based ration in free range and cages system and lastly is iii) to compare the carcass quality of turkey fed with dehydrated food waste based ration in free range and cages system. This research has been done in Ladang 2, Universiti Putra Malaysia. There are two treatment in this research which is free range system and cages system. There are 18 turkey in free range system and 18 turkeys in cages system. The turkeys are being fed with processed dehydrated food waste as the main ingredient. The water and feed were given *ad libitum*. The flock behaviour of turkey was recorded weekly. This is to ensure the turkey shows normal behaviour. The behaviour is important to observe whether the turkey is in comfort or not. The turkeys has been slaughtered in week 12 to evaluate the carcass quality. The carcass quality has been done by separate the carcass in two part. For the left part, the debonning process and the right part is for commercial cutting. The parameter measured were weekly body weight, weekly body weight gain, mortality rate, flock behaviour, feed and

grass analysis, weekly feed intake, feed conversion ratio (FCR) and carcass quality.

The feeds that were given to the turkey was formulated from the dehydrated food waste and processed. The food waste has been collected from restaurant and drying the food waste under the sunlight. Then, the dried food waste has been process and mixing with other ingredients such as rice bran, fish meal, vitamin, mineral, oils, limestone and salt. The feeds that has been process is mash form and can give directly to the turkey.

The mean body weight in free range system shows slightly higher weight compare to cages system but not significantly different ($P>0.05$). The mortality rate also shows not significant different between these two types of system. No significant different in feed conversion ratio between free range and cages systems. There are significant different between some parts of carcass such as weight of carcass, weight of wing and fat from both system.

In conclusion, turkey from free range system show better body weight than cages system. This is because the turkey in free range system has more space compare to cages system. Besides that, the turkey in free range also have extra feed from ground such as grass and insect.

KEYWORDS : Free range system, Cages system, *Meleagris gallopavo* (turkey), Carcass quality, Dehydrated Food waste

ABSTRAK

Tajuk kajian ini adalah prestasi ayam belanda diberi makan dengan catuan berasaskan sisa makanan kering dalam sistem lepas bebas dan sistem sangkar. Tujuan kajian ini adalah untuk menilai kesan sisa makanan kering ke atas prestasi ayam belanda dalam sistem lepas bebas(FRS) dan sistem sangkar (CS). Objektif utama kajian ini adalah untuk membandingkan prestasi ayam belanda yang dipelihara di bawah sistem lepas bebas dan sistem sangkar . Objektif khusus adalah i) untuk menilai prestasi pertumbuhan ayam belanda makan dengan catuan berasaskan sisa makanan kering dalam sistem lepas bebas dan sistem sangkar, ii) untuk mengenal pasti tingkah laku ayam belanda yang diberi makan dengan sisa makanan kering catuan berpangkalan dalam sistem lepas bebas dan sistem sangkar dan akhir sekali adalah iii) untuk membandingkan kualiti karkas ayam belanda yang diberi makan dengan sisa makanan kering catuan berpangkalan dalam sistem lepas bebas dan sistem sangkar. Kajian ini telah dilakukan di Ladang 2, Universiti Putra Malaysia.Terdapat dua rawatan dalam kajian ini iaitu sistem lepas bebas dan sistem sangkar.Terdapat 18 ekor ayam belanda dalam sistem lepas bebas dan 18 ekor ayam belanda dalam sistem sangkar. Ayam belanda diberi makan dengan sisa makanan kering sebagai bahan utama. Air dan makanan diberi secara itolic. Kelakuan ayam belanda dicatatkan secara mingguan. Ini adalah untuk memastikan ayam belanda menunjukkan kelakuan biasa. Tingkah laku ini adalah penting untuk memerhatikan sama ada ayam belanda selesa atau tidak . Ayam belanda telah disembelih pada minggu 12 untuk menilai kualiti karkas. Kualiti karkas yang dilakukan dengan mengasingkan karkas kepada dua bahagian.

Untuk bahagian kiri, proses mengasingkan daging dari tulang (debonning) dan bahagian kanan adalah untuk potongan komersial. Parameter yang diukur ialah berat badan mingguan, kenaikan berat badan badan mingguan, kadar kematian, tingkah laku kawan, analisis makanan dan rumput, pengambilan makanan mingguan, nisbah penukaran makanan (FCR) dan kualiti karkas.

Makanan yang diberikan kepada ayam belanda yang telah dirumuskan dari sisa makanan kering dan diproses. Sisa makanan yang telah dikumpulkan dari restoran dan pengeringan sisa makanan dilakukan di bawah cahaya matahari. Kemudian, sisa makanan kering telah proses akan dicampur dengan bahan-bahan lain seperti dedak, tepung ikan, vitamin, mineral, minyak, batu kapur dan garam. Makanan yang telah proses adalah berbbentuk serbuk halus dan boleh diberi secara langsung kepada ayam belanda.

Purata berat dalam sistem lepas bebas menunjukkan berat badan yang lebih tinggi sedikit berbanding dengan sistem sangkar tetapi tiada perbezaan yang ketara ($P > 0.05$). Kadar kematian juga tidak menunjukkan perbezaan yang ketara antara kedua-dua jenis sistem. Tiada perbezaan yang ketara dalam nisbah penukaran makanan antara sistem lepas bebas dan sistem sangkar. Terdapat perbezaan yang ketara antara beberapa bahagian karkas seperti berat karkas, berat sayap dan lemak dalam kedua-dua sistem.

Kesimpulannya, ayam belanda dari sistem lepas bebas menunjukkan berat badan yang lebih baik berbanding sistem sangkar. Ini kerana ayam belanda dalam sistem lepas bebas mempunyai lebih banyak ruang berbanding sistem

sangkar. Selain itu, ayam belanda dalam sistem lepas bebas juga mempunyai makanan tambahan dari tanah seperti rumput dan serangga.

KATA KUNCI : Sistem Lepas Bebas, Sistem Sangkar, *Meleagris gallopavo* (Ayam Belanda), Kualiti Karkas, Sisa Makanan



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LIST OF ABBREVIATION

FRS	Free Range System
CS	Cages System
DFW	Dehydrated Food Waste
FW	Food Waste
TMR	Total Mixed Rations
FCR	Feed Conversion Ratio
CP	Crude Protein
NDF	Neutral Detergent Fiber
ADF	Acid Detergent Fiber
ADL	Acid Detergent Lignin
GLM	General Linear Model
g	Gram
Kcal	Kilo Calories

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CHAPTER 1 :

INTRODUCTION

Over the past few decades production of poultry meat and eggs has grown faster than that of any other major food in the developing countries. This is a result of increasing demand for animal products due to increase in population income, urbanization and westernization of diet (Osama et al, 2013). Besides that, turkey is also an important poultry species reared for meat production. Many feeding regimens were practiced to reduce expense of turkey meat. One of them is grazing turkeys because it is cheaper than feeding with grains. Animals grazing pastures have more fiber than fed with grain. In pasture, it has been assumed that fiber is not digested by poultry however, some investigations have indicated that increased level of fiber may improve performance of chicks (Ricke et al, 1982)

Turkey are usually characterized by large tail feathers that spread into a fan when they are courting or alarmed. Turkey also have several oddly named appendages such as caruncles, snood, wattle and beard. A caruncle is a red fleshy growth on the head and upper neck of the turkey, a snood is the red fleshy growth from the base of the beak which hangs over the side of the beak, and a wattle is the red, loose appendage at the turkey's neck. A beard is the black lock of hairy feathers found on a male turkey's chest. Most turkeys raised for food have been genetically selected to have large breast meat, and they are unable to fly or reproduce without artificial insemination. They are fed a mix of corn and soybeans during their short life. Over 260 million turkeys are slaughtered for food each year in the United States, most

at about 14–18 weeks of age. Commercial, domestic hens (or female turkeys) weigh 15–18 pounds by 14–16 weeks of age, and heavy toms (or male turkeys) weigh 25-32 pounds by 16–18 weeks.

Within the free-range system (FRS) there are many not controllable and inherently variable factors, such as temperature, photoperiod, and light intensity that affect the results.. It was expected, that the performance of birds in a FRS would be inferior to that of birds in a more controlled environment because the former would be exposed to fluctuating temperature and increased exercise on paddocks, increasing their energy demands with consequent increase in the use of feed for body weight gain (Castellini et al. 2002). There has been a resurgence of interest in free-range poultry farming in recent years in developed countries, as a result of welfare concerns associated with farming of poultry under intensive conditions. For the “best positive welfare outcome”, birds should be free from hunger, thirst, discomfort, pain, injury, disease, fear and distress and able to express normal behaviours (Brambell et al, 2010).

However, in cages system (CS) the birds are confined to the house entirely, with no access to land outside, and it is usually adopted where land is limited and expensive. This has only been made possible by admitting the direct rays of the sun on the floor of the house so that par to the windows are removable, or either fold or slide down like windows of railway train to permit the ultraviolet rays to reach the birds.

This study is essential to relate the management of two systems which are the FRS and CS. Besides, it is also looking on the feeding management of turkey fed with food waste. On the other hand, the commercial feeds cost is higher. So by using food waste as turkey feed will reduce cost of feed. Thus, it also reduce the pollutions.



1.1 OBJECTIVES

The general objective of this study is to compare the performance of turkey reared under free range and cages systems.

The specific objectives of this study are:

1. to evaluate the growth performance of turkey fed with dehydrated food waste based rations in free range and cages systems
2. to identify the flock behavior of turkey fed with dehydrated food waste based rations in free range and cages systems
3. to compare carcass quality of turkey fed with dehydrated food waste based rations in free range and cages systems

1.2 HYPOTHESIS

Different production system will have different effects on the carcass quality of turkey in free range system (**FRS**) and cages system (**CS**). With proper feed formulation, dehydrated food waste (**DFW**) based rations will give similar performance to commercial feed for FRS and will more economical.

REFERENCES

- Brake, J., G. B. Havenstein, P. R. Ferket, D. V. Rives and F. G. Giesbrecht, 1995. Relationship of sex, strain, and body weights to carcass yield and offal production in turkeys. *Poultry Science*, 74: 161-168.
- Brambell, S., O.F. Kurbal, H. Demirulus and H. Inci, 2010. Growth Performance of Big-6 Broiler Turkeys in the Different Rearing Conditions. *Journal of Animal and Veterinary Advances*, 9: 1334-1337
- Bogdanov, I. A. 1997. Seasonal effects on free-range egg production. *World Poultry-Misset* 13:47-49.
- Castellini, C. Mugnai, C. and Dal Bosco A. 2002 – Effect of organic production system on broiler carcass and meat quality. *Meat Science* 60, 219-225.
- CAST, 1995. Waste Management and Utilization in Food Production and Processing. Council for Agricultural Science and Technology, Ames, IA
- Center for Integrated Agricultural Systems. (2003). *Large-scale pasture poultry farming in the U.S.* University of Wisconsin. Research brief #63.
- Derr, D. A., A. T. Price, J. L. Suhr, and A. J. Higgins. 1988. Statewide system for recycling food waste. *Biocycle* 29:58-63.
- Damerow, G. 2002. *Barnyard in Your Backyard*. Pownal, VT: Storey Publishing.
- Fanatico, A., 2006. Alternative poultry production system and outdoor excess. Butte, MT :National Center for Appropriate Technology. pp. 1-24

Fanatico, A.C., Pillai, P.B., Cavitt, L.C., Owens, C.M. & Emmert, J.L. (2005)

Evaluation of slower-growing broiler genotypes grown with and without outdoor access: growth performance and carcass yield.

Glen K. and Fukumoto. (2009) Small Scale Pastured Poultry Grazing System for Egg Production. Livestock Management July 2009 LM-20, University of Hawaii

Hahn, G. & Spindler, M. (2002) Method of dissection of turkey carcasses.

Word's Poultry Science Journal,58: 179–197.

Hermansen, J., Strudsholm, K. & K, Horsted. (2004) Integration of organic animal production into land use with special reference to swine and poultry. LivestockProduction Science, 90: 11–26.

Kornegay, E. T., G. W. Vander Noot, K. M. Barth, W. S. MacGrath, J. G.

Welch, and E. D.Purkhiser. 1965. Nutritive value of garbage as a feed . I. Chemical composition, digestibility and nitrogen utilization of various types of garbage.*J. Anim. Sci.* 24:319-324.

Lima, A.M.C. & Naas, I.A. (2005) Evaluating two systems of poultry

production:conventional and free-range. Brazilian Journal of Poultry Science, 7: 215–220.

Momcilovic, D. and & A Rasooly, A. (2000). Detection and analysis of animal materials in food and feed. *Journal of Food Protection*, 63: 1602-1609.

Osama, E.Y, Salim, G. A. A.H, and Bushara A. (2013) A Study on Turkey

(*Meleagris Gallopavo*) Raising in the Sudan. *Journal of Applied and Industrial Sciences*, 2013, 1 (4): 11-15

Pascoal, A., M. Prado, J. Castro, A. Cepeda, and J. Barros-Vela´zquez.

2004. Survey of authenticity of meat species in food products subjected to different technological processes, by means of PCRFLP analysis. *Eur. Food Res. Technol.* 218:306–312.

Puttaraksa, P., Molee, W., Khempaka, S. 2012 Meat Quality of Thai

Indigenous Chickens Raised Indoors or with Outdoor Access. *Journal of Animal and Veterinary Advances*, 11:975-978

Rodenburg, T., Van Harn, B.J., Van Krimpen, M.M., Ruis, M.A.W., Vermeij, &

Spoolder, H.A.M. (2008) Comparison of three different diets for organic broilers: effects on performance and body condition. *British Poultry Science*, 49: 74–80.

Ricke, S.C., P.J. van den Aar, G.C Fahey and L.L Berger, 1982. Influence of

Dietary Fibers on Performance and Fermentation Characteristics of Gut Contents from Growing Chick. *Poult. Sci*, 61: 1335-1343

Salatin, J. 1993. *Pastured Poultry Profits*. Swoope, VA: Polyface, Inc

Sarica, M., Karacay, N., Ocak, N., Kop, C. & Altop, A. (2007) *Effects of*

Barn(intensive) and Free-range systems on some behaviors of different genotypes of domestic turkeys. *Ege Univ. Ziraat Fak.*, 15 Kasim, 172—180, Izmir.

Sengul, T., 2001. Growth and Fattening Performance of Bronze Turkey,
203: 75-30

Shea, M. 2009. World Turkey Market : An Overview In Proceeding Of 3rd
Conference, Macclesfield, UK. 15-18. Cheshire, Turkeytimes.

Sundrum, A. (2001) Organic Livestock Farming: a critical review. *Livestock
Production Science*, 67: 207–215. The domestic turkey, *Meleagris
gallopavo Lab Anim October 3, 2001 35: 84-91*,

Waldroup, P. W., J. A. England, A. L. Waldroup And N. B. Anthony, 1997.
Response Of Two Strains Of Large White Male Turkeys To Amino
Acid Levels When Diets Are Changed At Three- Or Four-Week
Intervals. *Poultry Science*, 76: 1543-1555.

Yilmaz, O., H. Denk and M. Kucuk, 2011. Growth performance and mortality
in Hybrid Converter turkeys reared at high altitude region. *Bulg. J.
Agric. Sci.*, 17: 241-24