UNIVERSITI PUTRA MALAYSIA

CARCASS COMPOSITION, MUSCLE MORPHOLOGY, AND MEAT CHARACTERISTICS OF THE RED JUNGLE FOWL (Gallus gallus spadicious Linnaeus), VILLAGE CHICKEN, AND COMMERCIAL BROILER

LOKMAN HAKIM IDRIS

FPV 2011 27

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By

LOKMAN HAKIM IDRIS

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

December 2011

DEDICATION

To my father and late mother

To my wife Zurainy Omar

To my sons Amir Rusyaidi, Ammar Mirza,

Ammar Iskandar and Ammar Danial

for their support and encouragement

Abstract of the thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

CARCASS COMPOSITION, MUSCLE MORPHOLOGY, AND MEAT CHARACTERISTICS OF THE RED JUNGLE FOWL (*Gallus gallus spadicious* Linnaeus), VILLAGE CHICKEN, AND COMMERCIAL BROILER

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December 2011

Chairman: Professor Md Zuki Abu Bakar, PhD

Faculty: Veterinary Medicine

The current study was carried out with the main aim to define the morphology of muscle and to evaluate the meat characteristic of Red Jungle Fowl and Malaysian Village chicken which are known to have slow growth rates and an attempt was made to compare with the commercial broiler chicken which is known to have a fast growth rate. To our knowledge there is no data documented on the carcass composition of the Red Jungle Fowl and Village Chicken muscle at different ages. A total of 150 chickens from three different breeds were used in this study, they were Red Jungle Fowl (RJ), Malaysian Village Chicken (VC) and Commercial Broiler (CB) with 50 chickens for each breed. The eggs of RJ and VC were collected from Jenderam Hulu, Sepang, Selangor, hatched in the incubator and reared in the experimental house. The CB were collected from the CP (M) Private Limited

hatchery in Kuala Kangsar, Perak as Day 1 chicks and reared in the same experimental house. All the chickens were given starter (201C) commercial feed from Day 1 to Day 21 and finisher (203 P) commercial feed from Day 22 to Day 120 post hatch and water was provided *ad libitum*. Ten chickens from each breed were serially euthanized at Day 1, 10, 20, 56 and 120 post hatch. The *pectoralis major* was used to represent breast muscle and *bicep femoris* representing the thigh muscle. The muscle samples were fixed in 10% formalin for histological examination. Muscle fiber typing was done to evaluate the types of muscle fiber composition by acidic myosin ATPase staining. The proximate analysis was done using oven method for moisture and dry matter, furnace method at 600°C for ash and Kjeldahl method for the crude protein. The collagen contents in muscles were measured by analysing the hydroxyproline using spectrophotometer. The fatty acids were determined by GLC after extraction and methylation and the amino acid concentration was determined by HPLC. The muscle samples were also evaluated for the meat characteristic including colour, pH, cooking loss and shear force. There were no significant different ($P>0.05$) in the whole carcass, meat, bone and fat weights for the RJ, VC and CB at Day 1. However, as the age increased the RJ showed significantly ($P<0.05$) lower whole carcass, meat, bone and fat weights followed by VC and while CB. The meat to bone ratio in RJ was 30 % higher than the VC at Day 56 and 120 post hatch, but 50% and 40% lower than CB at Day 20 and 120 respectively. The RJ has lightest meat weight among the three breeds. The RJ had the smallest muscle bundle area, diameters of fibers in the breast and thigh muscles followed by the VC, while the CB was the highest. There were increases in the number of fibers in the breast and thigh muscles at Day 10 to 20 post hatch and at Day 56 to day 120 for RJ and VC. The RJ breast and thigh muscles had significantly ($P<0.05$) higher Type I and lower Type II

muscle fiber followed by VC and CB at all different ages evaluated. Type I fibers in the thigh muscle were nearly 50% higher than the breast muscle and Type II muscle fiber was 10.25%, 5.4% and 5.7% lower in RJ, VC and CB respectively in the thigh muscle compared to the breast muscle. There were changes of Type II to Type I muscle fiber as the age increased. The crude protein of breast in RJ and VC were significantly ($P<0.05$) higher than the CB at Day 20 and 56 post hatch. The crude protein at younger ages (Day 1) were significantly ($P<0.05$) higher than at older ages (Day 120). The crude protein were 19.78 %, 20.40% and 20.04% in RJ, VC and CB breast muscle respectively at Day 120 and 20.57 %, 22.09% and 24.06% respectively at Day 1 post hatch. The composition of MUFA was lower, but the composition of PUFA was higher in the RJ and VC compared to the CB breast muscles. Within the breeds the composition of total MUFA were decreased as the age increased and the composition of total PUFA were increased as the age increased. The total MUFA and PUFA showed no significant difference ($P>0.05$) between the breast and thigh muscles at different ages evaluated. Maternal diets were the main factors in determining the composition of fatty acid and amino acid at Day 1 and Day 10 post hatch. Within the breeds, the composition of amino acids increased as the age increased a reflected by the growth of the muscle in suggesting different catabolism, metabolism and absorption rates among the breeds. The pH of the breast muscle in RJ was the highest (6.18, 5.89 and 5.96 at day 20, 56 and 120 respectively) followed by VC (6.09, 5.85 and 5.70 at day 20, 56 and 120 respectively) and CB (5.89, 5.76 and 5.74 at day 20, 56 and 120 respectively) while for the thigh muscle, there was no significant difference ($P>0.05$) between the three breeds. Comparing the breast and thigh muscles regardless of the breeds, generally, the pH of thigh muscle was significantly higher ($P<0.05$) than the breast muscle. The colour of breast and thigh

muscles of RJ and VC appeared more reddish (a*) and less lightness (L*) compared to the CB. In general, the colour of breast muscle of RJ, VC and CB appeared lighter and more yellow than the thigh muscle, while the thigh muscle appeared more reddish than the breast muscle. There was negative correlation between pH and L* value (r = - 0.48) and positive correlation to the a* value (r = 0.43) in all breeds and ages evaluated. The b* value also showed positive correlation (r = 0.4) to the pH in all breeds and ages evaluated. The total collagen contents in the muscle increased as the age increased for all the three breeds evaluated. Total collagen contents in the breast and thigh muscles were significantly higher in the RJ followed by the VC and CB, and the collagen contents of the thigh muscles were higher than the breast muscle. Thus, the shear force values were higher in RJ followed by VC and CB and the shear force value in the thigh muscle was higher than the breast muscle in all breeds evaluated, and consequently producing less tender meat. There was a positive correlation of collagen content and shear force value in both breast and thigh muscles (r = 0.61). The cooking loss of breast and thigh muscles in RJ and VC were higher compared to the CB and the thigh muscle were higher cooking loss than the breast muscle. The pH value showed a negative correlation (r = - 0.2) with the cooking loss but the results revealed that the amount of collagen was more important than the pH itself in determining the cooking loss. Cooking loss also showed a positive correlation (r = 0.48) with the shear force value. The RJ had a lower meat yield, less tender meat with a low water holding capacity. However, the meat contained less fat, higher crude protein, higher meat to bone ratio and were reddish in colour compared to CB. The VC parameters were always midway between the two breeds. The present study contributes to the knowledge of the field of study in the morphology and meat characteristic as well as to improve the breeds of local birds for a better quality meat.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KOMPOSISI KARKAS, MORPHOLOGI OTOT, DAN CIRI-CIRI DAGING AYAM HUTAN MERAH (*Gallus gallus spadicious* Linnaeus), AYAM KAMPUNG, DAN AYAM DAGING KOMERSIAL

Oleh

LOKMAN HAKIM IDRIS

Disember 2011

Pengerusi: Profesor Md Zuki Abu Bakar, PhD

Fakulti: Perubatan Veterinar

Kajian terkini ini adalah bertujuan untuk mengenalpasti morphologi otot dan membuat penilaian keatas cirri-ciri daging Ayam Hutan Merah dan Ayam Kampung Malaysia yang diketahui mempunyai kadar tumbesaran yang rendah dan perbandingan dibuat dengan Ayam Daging Kormersial yang mempunyai kadar tumbesaran yang tinggi. Daripada pengatahuan kami, tiada data darisegi komposisi karkas Ayam Hutan Merah dan Ayam Kampung di peringkat umur yang berbeza. Sejumlah 150 ekor ayam digunakan didalam kajian ini iatu Ayam Hutan Merah (RJ), Ayam Kampung (VC) dan Ayam Daging Komersial (CB). Telur ayam RJ dan VC di perolehi dari Jenderam Hulu, Sepang, Selangor, ditetaskan dan dipelihara di bangunan penyelidikan. Anak ayam CB yang berumur sehari di perolehi dari syarikat CP (M) Private Limited hatchery di Kuala Kangsar, Perak dan dipelihara di bangunan penyelidikan yang sama. Kesemua ayam-ayam ini diberi makanan permulaan (201C) komersial diberi dari umur sehari hingga 21 hari dan makanan

penamat (203P) komersial dari umur 22 hari sehingga umur 120 hari dan air minuman diberi secara *ad libitum*. Sepuluh ekor ayam dari setiap baka akan dimatikan pada umur 1, 10, 20, 56 dan 120 hari. Untuk ujian histologi sampel di rendam didalam larutan formalin dengan kepekatan 10%. Otot *pectoralis major* digunakan bagi mewakili otot dada dan otot *bicep femoris* digunakan bagi mewakili otot peha. Penilaian keatas penentuan jenis serat otot dibuat berdasarkan kepada *myosin ATPase staining* berasid. Bagi analisa proksimat pula, kaedah ketuhar digunakan bagi penentuan kelembapan dan bahan kering, dan kaedah relau pada suhu 600°C digunakan untuk penentuan abu manakala kaedah Kjeldahl digunakan bagi penentuan protein kasar. Kandungan kolagen di dalam otot di tentukan dengan menganalisa kandungan hydroxyprolline menggunakan spectrofotometer. Kandungan asid lemak ditentukan dengan menggunakan GLC selepas penghasilan dan methylation. Penentuan kandungan asid amino adalah menggunakan kaedah HPLC. Penilaian keatas ciri-ciri daging juga dibuat berdasarkan kepada warna, pH, peratus kehilangan air selepas dimasak dan nilai daya ricih. Tidak terdapat perbezaan yang ketara ($P>0.05$) dari segi berat keseluruhan karkas, daging, tulang dan lemak bagi RJ, VC dan CB pada hari pertama. Walaubagaimana pun apabila umur meningkat, RJ menunjukkan berat keseluruhan karkas, daging, tulang dan lemak adalah yang terendah diikuti oleh VC dan CB yang menunjukkan perbezaan yang ketara ($P<0.05$). Nisbah antara daging dan tulang pada RJ adalah 30% lebih tinggi dari VC pada umur 56 dan 120 hari tetapi 50% dan 40% lebih rendah dari CB pada umur 20 dan 120 hari. Berat tulang RJ adalah paling ringan diantara ketiga-tiga baka dan penilaian morphologi menunjukkan saiz berkas otot, diameter serat otot dada dan peha adalah terendah diikuti oleh VC dan CB. Kajian juga menunjukkan bilangan serat bertambah pada umur 10 hingga 20 hari dan pada umur 56 hingga 120 hari bagi

RJ dan VC. Otot dada dan peha bagi RJ mengandungi kandungan serat *Type1* yang tinggi dan *Type 11* yang rendah diikuti oleh VC dan CB. Kandungan protein kasar didalam otot dada bagi RJ dan VC adalah lebih tinggi dari CB dan terdapat perbezaan yang ketara ($P<0.05$) pada umur 20 dan 56 hari. Protein kasar di peringkat umur sehari adalah lebih tinggi dari umur 120 hari dimana 19.79% bagi RJ, 20.40% bagi VC dan 20.04% bagi CB pada umur 120 hari dan 20.57 bagi RJ, 20.57% bagi VC dan 24.06% bagi CB bagi umur sehari. Komposisi MUFA adalah rendah manakala PUFA adalah tinggi bagi RJ dan VC jika dibandingkan dengan CB dan dikalangan baka menunjukkan kandungan MUFA menurun dan PUFA meningkat apabila umur ayam meningkat. Tidak terdapat perbezaan yang ketara ($P>0.05$) dibandingkan diantara otot dada dan otot peha. Pemakanan induk merupakan faktor utama bagi penentuan kandungan asid lemak dan asid amino pada umur sehari dan hari kesepuluh. Komposisi asid amino meningkat apabila umur ayam meningkat dipengaruhi oleh kadar tumbesaran ayam. Perbezaan komposisi juga menunjukkan perbezaan katabolisma, metabolisma dan penyerapan amino asid di kalangan baka yang diuji. Otot dada RJ mempunyai nilai pH yang paling tinggi (6.18, 5.89 dan 5.96) pada umur 20, 56 dan 120 hari diikuti oleh VC (6.09, 5.85 dan 5.70) pada umur 20, 56 dan 120 hari dan CB (5.89, 5.76 dan 5.74) pada umur 20, 56 dan 120 hari. Manakala pH otot peha tidak perbezaan yang ketara ($P>0.05$) diantara ketiga-tiga baka dan otot peha menunjukkan pH yang lebih tinggi dari otot dada dengan perbezaan yang ketara ($P<0.05$). Warna otot dada dan peha bagi RJ dan VC adalah lebih kemerahan (a*) dan kurang terang (L*) jika di bandingkan dengan CB. Secara keseluruhannya otot dada menunjukkan warna kekuningan dan lebih terang daripada otot peha, manakala otot peha lebih menunjukkan warna kemerahan. Terdapat kolerasi negetif ($r= -0.48$) diantara pH dan nilai L* dan kolerasi positif ($r= 0.43$)

diantara pH dan nilai a* dikalangan kesemua baka yang diuji. Nilai b* juga menunjukkan kolerasi yang positif (r= 0.40) dengan pH bagi kesemua baka. Jumlah kandungan kolagen didalam otot dada dan peha menunjukkan peningkatan apabila umur ayam meningkat dengan jumlah kolagen didalam RJ adalah yang tertinggi diikuti oleh VC dan CB dengan perbezaan yang ketara dan jumlah kolagen didalam otot peha juga adalah lebih tinggi dari otot dada ianya secara langsung mengakibatkan nilai daya ricih yang tinggi didalam RJ diikuti oleh VC dan CB. Nilai daya ricih pada otot peha adalah lebih tinggi dari otot dada. Terdapat kolerasi positif (r= 0.61) diantara kandungan kolegen dengan nilai ricih didalam otot dada dan peha. Kehilangan air selepas dimasak bagi otot dada dan peha bagi RJ dan VC lebih tinggi dari dan kehilangan air didalam otot peha adalah lebih tinggi dari otot peha. Nilai pH menunjukkan kolerasi yang negetif (r= -0.2) dengan kehilangan air dan ianya menunjukkan faktor kandungan kolagen adalah lebih utama dari pH dalam menentukan kehilangan air. Kehilangan air selepas dimasak juga menunjukkan kolerasi yang positif (r= 0.48) terhadap nilai ricih. Penghasilan daging bagi RJ adalah lebih rendah, lebih keras dan mempunyai kapasiti pegangan air yang rendah, namun begitu daging RJ mengandungi lemak yang rendah, kandungan protein kasar yang tinggi, nisbah daging dan tulang yang tinggi dan berwarna kemerahan berbanding dengan baka CB manakala parameter bagi baka VC adalah diantara RJ dan CB. Hasil kajian terkini ini menyumbang kepada pengatahuan di dalam bidang kajian dari segi morphologi dan krateria daging untuk meningkatkan kualiti daging.

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I am grateful to Department of Veterinary Services of Malaysia for giving me the opportunity to further my study and the assistance during the period of this study.

I certify that a Thesis Examination Committee has met on 28 December 2011 to conduct the final examination of Lokman Hakim Idris on his thesis entitle "Carcass Composition, Muscle Morphology, and Meat Characteristic of Red Jungle Fowl (*Gallus gallus spadicious* Linnaeus), Village Chicken, and Commercial Broiler" in accordance with Universities and University College Act 1971 and the Constitution of Universiti Putra Malaysia [P.U.(A) 15 March 1998. The committee recommends that the student be awarded the Doctor of Philosophy.

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This thesis was submitted to the Senate of Universiti Putra Malaysia as fulfillments of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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DECLARATION

I declare that the thesis is my original work except for the quotation and citation which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or other institutions.

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LOKMAN HAKIM IDRIS

Date: 28 December 2011

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ATP	Adenosin Triphosphate
Ala	Alanine
Asp	Aspartic acid
ANOVA	Analysis of Varians
Arg	Arginine
C8:0	Caprylic acid
C10:0	Capric acid
C14:0	Myristic acid
C16:0	Palmitic acid
C18:0	Stearic acid
C16:1	Palmitoleic acid
C18:1	Oleic acid
C18:2n-6	Linoleic acids
C20:4n-6	Arachidonic acid
CB	Commercial Broiler
$CoCl_2$	Cobalt Chloride
$CaCl_2$	Calcium Chloride
$CaPO_4$	Calium Phosphste
CoS_2	Cobalt sulfide
Cys	Cystine
cm	Centimeter
°C	Degree Celsius
FAME	Fatty Acids Methyl Esters
Glu	Glutamic acid

Gly	Glycine
g	Gram
His	Histidine
Ile	Isoleucine
kg	Kilogram
Lys	Lysine
Leu	Leucine
MUFA	Monounsaturated Fatty Acids
ml	Milimeter
mM	MiliMolar
mg	Miligram
mm	Milimeter
M	Molar
Min	Minutes
Met	Methionine
N	Normal
nm	Nanometer
Phe	Phenylalanine
PUFA	Polyunsaturated Fatty Acids
pH	Hydrogen Ion Concentration
Pro	Proline
RJ	Red Jungle Fowl
SPSS	Statistic Package Social Science
SFA	Saturated Fatty Acids
SEM	Standard Error of the Mean

Ser	Serine
Tris–HCl	Tris-Hydrochloride
Thr	Threonine
Trp	Tryptophan
Tyr	Tyrosine
µm	Micrometer
µl	Microliter
µg	Microgram
Val	Valine
VC	Village Chicken
%	Percentage

CHAPTER 1

INTRODUCTION

The structure of the avian skeletal muscle varies depending on the muscle types, species and breed of the animal, all of which contribute to the differences (Wattanachant *et al.,* 2005). The muscle morphological characteristics of various species have been investigated before in terms of association with the meat quality (Cooper *et al.,* 1968) which can be partitioned into several attributes, mainly the sensory (colour, tenderness, flavor, juiciness) and the physical (muscle yield, water-holding capacity, cooking loss) parameters which vary with growth rate and body composition (Duclos *et al.,* 2007).

In general, chicken growth is well described as a sigmoid curve with an initial exponential development phase, an intermediate or transitory phase, and a final phase of slow growth that consists of a gradual reduction in the growth rate (Aguilar *et al*., 1983). During the growth of the animals, the proportion of bones, muscles and fat in the body change continuously and the rate of the changes vary among these animals. The animals produce carcass with distinctive characteristic that are peculiar to the breeds due to the ability of these animals to grow and develop in a characteristic manner (Forrest *et al*., 1975).

Typically, as the animal age increased, the compositions of body and muscle also change. In general, parameters such as the intramuscular fat and protein increased while moisture content decreased (Aberle *et al*., 2001) and the amount of collagen

increased (Nakamura *et al*., 1975). In poultry, different composition of unsaturated fatty acid and amino acid such as glutamic acid, arginine, leucine, aspartic acid and lysine were probably due to differences in the feeding behavior between the breeds (Wattachant *et al*., 2004). However, the precise reasons have not been found so far (Lawrie, 2006). The presence of collagen fiber in the skeletal muscle is an important factor related to the development of meat toughness (Purslow, 1999). Total amount of collagen and the structure of perimysium are the major factors determining the toughness of chicken meat (Liu *et al.,* 1996).

The compositions of muscle fiber were related to intrinsic and extrinsic factors (Lawrie, 1985) such as selection, gender, age, breed, hormones and physical activity. Generally, individual muscle fiber type exhibits different contractile, metabolic, physiological, chemical and morphological characteristics (Lee *et al.,* 2010) and the interaction between the factors and the outcome were not really understood (Lawrie, 1985; Lawrie, 2006).

The Red Jungle Fowl is known as the ancestor of all domestic fowls which are classified as omnivorous and with slow growth rate (Wall and Anthony, 1995). The Red Jungle Fowl populated from northeast India eastwards across Southern China and down into Malaysia and Indonesia (Condon, 2006). The Malaysian Red Jungle fowl was first reported by Madoc (1956) who believed that the domestication of Red Jungle Fowl was done by Malaysian abrogenies called Sakai where they took the eggs of jungle fowl and hatched them using female domestic chickens. The Red Jungle Fowl (*Gallus gallus*) consists of five subspecies which is *Gallus gallus gallus*, *Gallus gallus spadiceus*, *Gallus gallus jabouillei*, *Gallus gallus murghi* and *Gallus*

gallus bankiva. The differences in the subspecies are based on certain morphological features mainly the length, shape and colours of the neck feathers, size and colours of ear lobes (Delacour, 1977). The reported subspecies found in Peninsular Malaysia is *Gallus gallus spadicieus* and are known by various names such as Ayam Beroga, Ayam Denak and Ayam Hutan (Amin Babjee, 2009).

The Village Chickens are generally the indigenous breeds living in almost symbiotic relationship with human communities (Spradbrow, 1993). As in other countries of South-East Asia, these indigenous chickens have been reared extensively for generations, in almost every village and suburb area, in free-range or integrated farming system (Aini, 1990). The Village Chicken (*Gallus gallus domesticus*) is said to be descended from the South-East Asia Red Jungle Fowl (*Gallus gallus spadiceus*) through natural mating and selections (Collias and Saichau, 1967).

The present Malaysian Village Chicken, commonly known as "ayam kampung" (village chicken), is the result of crossbreeding of the Red Jungle Fowl with mixed exotic domestic breeds brought by Europeans, mainly the British (Azahan and Zahari, 1983; Peterson *et al.,* 1991). Close inbreeding occurs among the indigenous stock (Aini, 1990). The unplanned multiple mating of the various domesticated breeds introduced into an area, makes it difficult to standardize their characteristics and production performances of Village Chicken in different localities (Oh, 1987). In general, the Village Chickens are slow growth rates (Young, 1992), dual-purpose types, small body size, different colours of plumage, variable body conformation and physical characteristics (Aini, 1990). In Malaysia, certain consumers preferred a taste of Village Chicken where presently only a small market but their popularity is

rapidly growing because its meat unique taste and texture (Azahan and Norazizah, 1994).

On the other hand, Commercial Broiler Chickens are comprised of variety of breeds such as the Red Cornish, New Hampshire, Barred Plymouth Rock, Antwerp Belgian, Cornish, Rhode Island Red, Leg horn and Wyandotte. It is kept for commercial purposes and fed with commercial poultry feed. Tremendous progress has been made in the selection of broilers to increased growth, feed conversion and carcass quality (Schreiweis *et al*., 2005; Steven, 1991). Genetic selection, heterosis and improvements in husbandry, nutrition and health have contributed to an escalating growth rate of meat–type chickens. During the late 1940s, 12 weeks were required for broilers to reach a live body weight of 1.8 kg. Four decades later this period had been reduced by half (Glyes, 1989).

In Malaysia, the Commercial Broiler industries were already established and self sustain with the population of 103.6 million birds in 2008, where more than 40 million birds were exporting to Singapore a year (DVS, 2008). The populations of Village Chicken were 8.6 million (DVS, 2008) and keep increasing in semi-intensive and free range production system (Aini, 1990). The industries become more importance as one of Malaysian Government tool to help the villagers. There was no reported population of Red Jungle Fowl in Malaysia since the birds were life wild in the jungle, plantation and estates (Amin Babjee, 2009). There were potential niche markets in the future for Red Jungle Fowl although the breeds were protected by the government at this time. Both breeds have high potential of breed improvement in the future.

In Malaysia most of the studies done on the Village Chicken have been focusing on the development, rearing system and diseases itself (Azahan and Zahari, 1983; Ramlah, 1996; Ganabadi *et al.,* 2008). However to our knowledge there is no data documented on the chemical composition of the Red Jungle Fowl and Village Chicken muscle at different ages and to understand the underlying biochemical mechanisms that relate to meat characteristic, the inherent qualities of muscle fiber in different growth rates should be discussed (Mckee, 2003). The main objective of this study was to determine the chemical composition and muscle characteristic of breast and thigh muscle of Red Jungle Fowl (RJ) and Village Chicken (VC), compared with the Commercial Broiler (CB), the latter being a breed with high growth rate.

The objectives of the study were:

i. to evaluate the carcass composition of RJ, VC and CB and their relation with growth performance
ii. to describe the morphology of breast and thigh muscles of RJ and VC in comparison with CB.
iii. to determine the chemical composition of breast and thigh muscle of RJ and VC in comparison with CB.
iv. to characterise the meat characteristic of breast and thigh muscles of RJ and VC in comparison with CB
v. to determine the association between the morphological characteristics and chemical composition of breast and thigh muscles with meat characteristic.

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