بسم الله الرحمن الرحيم

Phenotypic & Genetic Characterization of Sudanese Large and Bare-neck Baladi Birds

Sudan University of Science and Technology

Scientific Research Council

Research Proposal Form

FOR OFFICIAL USE ONLY		
Date of submission	**Research area**	**Serial number**

Section One: General information

Title of the Research Project:
Phenotypic and Genetic characterization of Sudan Large and Bare-neck baladi Birds

Title in Arabic: الخصائص الشكلية و الوراثية للدجاج البلدى الكبير و عارى الرقبة (الرقبانى) السودانى

College: Veterinary Medicine and Animal Production
Department: Animal Production

Project Language	Project Duration	Project Budget
English	**3 years**	**122 000 SDG**

Principle Researcher:
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Participant Researchers:

	Name	Instituation
1	Osama El Shaikh Yassin	College of Vet Med and Anim Prod
2	Badr Hassab El Rassol Aljak	College of Vet Med and Anim Prod
3	Mohamed Alamin Hamad	College of Vet Med and Anim Prod
4	Shadia A/Aati	College of Vet Med and Anim Prod
5	Shams Eldin Hasab Alla	College of Vet Med and Anim Prod
6	Rania Mohamed Shams Eldin	College of Vet Med and Anim Prod
7	Elfadil Ahmed Adam	College of Vet Med and Anim Prod
8	Intisar Yousif Turki	College of Vet Med and Anim Prod
9	Imad Mohamed Tahir	College of Vet Med and Anim Prod

Head of the Research Unit:

Name: Signature: Date:

Dean of the College:

Name: Signature: Date:

Section Two: Project Description 3 yrs

1/ Summary:

Phenotypic and genetic potentials of Large and Bare-neck baladi birds will be studied. This include growth, productive and reproductive performance; adaptive potentials to both hot environment and some diseases; chemical, biochemical and haematological profile; and nutritional requirements.

2/ Justification:

Modern poultry production in the Sudan depends largely on imported birds being parents or commercial hybrids. These modern production systems meets only 10-15% of the present country needs; the rest 85-90% are met by the local indigenous flocks at comparatively very low cost being cheap low producing scavengers.

The modern production systems depends on foreign breeds and hybrids importation which limits self-dependence for poultry development, dissolves and drains off the local adapted indigenous birds in addition to foreign currency demands.

Inspite of higher production by the foreign breeds and hybrids, their importation brought new diseases not known before in developing countries.

Local and indigenous birds are national economic resource for rural and pre-urban areas and are an international genetic resource for genetic engineering and molecular biology.

3/ Goals:

Establishing basic data on Sudanese local birds.

Improvement of the capabilities of these birds.

4/ Specific Objectives:

*Establishing data base on the performance of Sudan “Large Baladi” and “Bare-neck” birds.

*Phenotypic and genetic characterization of Sudan “Large Baladi” and “Bare-neck” birds.

*Estimation and determination of genetic and phenotypic parameters for egg and meat production traits.

*Assessment and identification of adaptive physiological factors, nutritional requirements under tropical Sudan environmental conditions and disease resistance profile.

*Long term project to establish a permanent selection policy for the improvement and development of Sudan-bird.

5/ Literature Review:

Indigenous chickens are raised all-over the Sudan as subsidiary family income source at low negligible cost. The present per capita consumption is estimated at 1 kg of poultry meat and 1- 1.5 kg of eggs which is very low compared to regional and international standards. (9 kg meat, 9kg egg. FAO).

Many developing countries have built and established local well adapted producer birds. As known, high ambient temperature in tropical and subtropical areas has been a major factor hindering the productive performance of chickens in hot climates, especially in developing countries. Moreover, the adverse effect of high temperature is more pronounced when the relative humidity is high. Farmers cannot afford costly artificial control of high ambient temperature in open-sided chicken houses. So that, the introduction of genes known to improve heat tolerance by controlling the density of feather coverage (e.g. naked neck, frizzle) should be of practical interest in order to increase the viability and productive adaptability as well as improving health in commercial breeder flocks. The indigenous fowl is less prolific compared to exotic breeds .Desai *et al* (1961) reported 106 , 68 and 86 eggs per bird per year for Bare-neck ,Large Baladi and Betwil respectively. While egg size that measured as egg weight is smaller, resulting in low mass output (g/bird/day). The main factor that contributes to shell quality and strength is shell thickness because it affects market value through resistance to cracking and for its effect on hatchability. Many genetic and non – genetic factors affected egg – shell thickness, in particularly breed effect and feed quality.

There were no differences in egg production and egg size within and among local types. The rate of egg production during the laying period was 47.14, 38.57 and 48.57 percent for bare – neck (B N), Betwil (BT) and large Baladi (L B) respectively. The low production capacity of Betwil type could

be due to sex –linked dwarfing gene, which found to have a negative effect on laying performance of the affected hens (Bullerman,1982).

Desai (1962) and Wilson(1985) reported close results for Sudan indigenous egg weight .However ,Yousif (1987) and Sulieman(1996) obtained higher average egg weight (42.2 and 40.69) gm respectively, for Sudan large Baladi.

The naked neck gene (Na) is a domenant gene. It was utilized in poultry breeding programs in tropical and sutropical areas. The main effect of the gene is reducing the whole feather weight percentage in neck and breast areas by about 25 – 40 % as compared to normal chickens (na) resulting in a better heat tolerance (Galal, 2000). Yahav *et al* (1998) stated that the reduced feather coverage shuold improve and enhance heat dissipation and concequently alleviate the effects of heat stress on chickens reared in hot climates. On the other hand the Na gene had a favorable peliotropic effects onadult fitness, production adaptability, meat yield, weight gain and feed conversion (Singh *et al*, 2000). The Na gene also improved shell thickness and breaking strenght by about 10 and 9 respectively (Galal and Fathi, 2002). In addition El-Safty (2006) concluded that laying hens carrying Na gene had a superior egg weight, egg number, egg intensity, egg mass, shell thickness and shell strenght compared with normally feathered hens.
The microsatellite and randomly amplified polymorphic DNA (RAPD) techniques were used by Rania (2006) to estimate the genetic variation in Sudanese local chicken, the results revealed that, a total of 281 alleles were observed across 29 loci and the number of alleles per locus ranged from 2-11. in 3 of these 29 loci there are 3 new alleles found only in thr Sudaese large baladi which did not reported in any other breed.

6/ Key Words: Naked neck gene, tropical birds, productive traits and disease resistance.

7/ Methodology:
A bout 400 (parent) birds (200 bare neck and 200 large baladi) will be randomly collected and kept in batteries (6 birds /cage) and fed on a balanced diet (according to the requirement established by N. R. C.,1994). Each breed-type birds will be weighed and allocated into 20 groups. A single male will be used for each group, their offspring will be allocated into 20 groups of half sibs. Each sib group consists of 10 females and one male(F_1, the first generation). From F_1 a 20 groups of half sibs wil be allocated in a nested design.

Measurements will be taken on the offsprings for various phenotypic characteristics.

Experimental period:

The duration will be about 3 years, the flock will be vaccinated against fowl box, New castle disease and internal and externnal parasites.

Data Recorded:

Birds will identified individually using led signs .The following data will be collected :

A -From parents: The data will be collected from parents are:

Body weight(kg). Egg production rate % (H. D%). Egg weight (g). Feed intake (g /week). Feed conversion ratio.(gm feed/gm gain). Fertility %.. Hatchability %. Embryonic mortality %.

B –From both F_1 and F_2 ,the following data will be collected:

1-From offspring:

These were divided into two groups:

a/ Performance data:

Live body weight (gm). Weekly body weight gain (gm/ week). Growth rate %. Feed intake (gm /week). Feed conversion ratio (gm feed /gm gain)

b /Reproductive traits:

Puberty age (age at first egg) (month). Puberty weight(kg). Live body weight at first egg (kg). Fertility %. Hatchability %

c /Egg quality measurements:

Egg weight and differential weight (gm). Specific gravity. Egg index (%). Albumen index (%). Haugh units. Shell thickness(mm)

d /Carcass measurement and meat quality :

Slaughter weight (kg). Hot carcass weight (kg). Cold carcass weight (kg). Dressing out percentage. Commerical cut weight (gm)

e /Meat quality parameters:

Meat analysis. Sensory evaluation.

f- Physio-biochemical parameters: (some macro & micro elements) some metabolites. Haematological indeces.

g/ Molecular biology parameters.

Statistical Analysis:

The collected data will be entered in a spread sheet and analyzed using Harrey's (1990) least squares programme (model 3,half and full sibs).Other models and statistical method will be developed as the need arises.

Heritability estimation : Heritability will be estimated using the paternal half sib method as follows:

$$H = 4s / P$$

Where,

H = Heritability

S = Variance component between sires.

P = Total phenotypic variance.

8/ References:

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Yousif,I.A(1987).Phenotypic and genetic variation in body weight of the indigenous chicken.(M.Sc.thesis), faculty of Animal production ,University of Khartoum ,9-17.

Section Three: Researchers and their Responsibilities:

Researchers	**Qualification**	**Academic Status**	**Main Specialty**	**Responsibilities**
1/Mohamed Tageldin Ibrahim	Ph. D Animal Production	Associate professor	Anim. Prod.	Team leader
2/ Badr Hassab ElRassol ElJak	Ph. D Animal Production	Assist professor	Anim. Prod.	Poultry Prodction & management

3/Osama El shaik Yasin	Ph. D Animal Production	Associate professor	Anim. Prod.	Adaptation physiology
4/Shadia Al Aati	Ph.D Vet Med	Associate professor	Anim Physiology	Physiological parameters
5/Shams Eldin Hasab Alla	Ph.D Vet Med	Assist professor	Anim Physiology	Physiological & adaptive parameters
6/Mohamed Alamin Hamad	M.Sc. Anim Prod	Associate professor	Anim. Prod.	Management
7/Elfadil Ahmed Adam	M.Sc. Anim Prod	Lecturer	Anim. Prod.	Poultry egg & meat production
8/Imad Mohamed Tahir	Ph.D Vet Med	Assist professor	Biochemistry	Biochemical & molecular parameters
9/Rania Mohamed Shamseldin	M.Sc. Genetics and Moleculler Biol	Lecturer	Genetics & Molecular biology	Molecular biology

Section Four: Budget Phases:

Duration of the Project 3 yrs Total budget 122 000 SDG ……..
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Research Council Decision:

Council Secretary::
Name:
Signature:
Date:

Council vice President:
Name:
Signature:
Date: