

**GENETIC FINGERPRINTING OF SELECTED
EGYPTIAN SHEEP STRAINS COMPARED
TO OSSIMI BREED**

BY

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B.Sc. Agric. Sc. (Animal Production), Aleppo University, 2004

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ABSTRACT

Ibrahim Mohamed Khair Kayali : Genetic Fingerprinting of Selected Egyptian Sheep Strains Compared to *Ossimi* Breed. Unpublished M. Sc. Thesis, Department of Genetics, Faculty of Agriculture, Ain Shams University, 2009.

Two strains of El-Adely sheep and Ossimi breed were characterized using biochemical and molecular genetic techniques. Protein banding pattern using SDS and native gel electrophoresis were carried out to identify the biochemical genetic fingerprint of each El-Adely sheep strains (HOR and HMY) and Ossimi breed .Meanwhile, randomly amplified polymorphic DNA (RAPD) technique was also carried out to identify the molecular genetic fingerprint for the same individuals using seven random primers.

There were some specific bands (markers) on the biochemical and molecular level, which can differentiate among El-Adely sheep strains and Ossimi breed. The genetic homogeneity percentages within each of Ossimi breed, El-Adely HOR strain and El-Adely HMY strain were 53% ,37% and 55% respectively . Similarity value based on SDS-PAGE, Native-PAGE and RAPD-PCR analysis was the highest between the two strains of El- Adely sheep (HOR and HMY) strains ,while it was the lowest between Ossimi breed and El-Adely sheepHOR strain . Also, similarity value was low between El-Adely sheep HMYstrain and Ossimi breed. The dendrogram was constructed among the studied sheep groups based on SDS- PAGE , Native -PAGE and RAPD analyses and showed that Ossimi breed was distantly related from both the two strains of El-Adely sheep (HOR and HMY) strains.

The present study revealed that SDS-PAGE, Native-PAGE and RAPD- PCR techniques could be strongly recommended as useful tools for detecting fingerprint, determination of polymorphism and establishing the genetic relationships among different sheep genotypes.

Key words: Sheep, *Ossimi* breed, *El-Adely* strains, SDS-PAGE, Native-PAGE, RAPD-PCR, fingerprint, homogeneity percentage and genetic similarity.

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I. INTRODUCTION

Sheep spread in different parts of the world which represent an important resource of animal protein, and are considered as the main resources of income in several countries . There are many types of sheep breeds; wool type, dairy type and meat type .The major breeds of sheep in Egypt are Ossimi, Rhmani and Barki. In addition, there are some minor sheep breeds such as Abidi, Abudelek, Farafra, Maenit, kanzy, Saidy , Sanabawi and Sohagy. In Egypt several trials have been carried out to improve their production by selection or crossing with European breeds with the use of good management.

There are about 3.924 million heads of sheep in Egypt (**Mervild, 2007**). Mutton is very favorable for Egyptian people but many people are unable to buy it due to the high price and limited supply in meat markets. Therefore, Egypt imports annually a huge amount of meat to face its high demand. Furthermore, ewes of the different local sheep breeds are scrawny, as sheep breeders neglect the milking of their ewes. Selection is always oriented towards meat characters. They neglect also the technology of transformation of sheep milk to cheeses that are largely imported every year to cover tourist demand. Egyptian sheep breeds are raised as dual purpose animals (meat and wool) but never as a milk type animal.

The problem of sheep production and the frail sheep products in Egypt is the weak productivity and the pathetic reproductive traits of the local sheep breeds which reflect a feeble profitability from its project that could be attributed to the dreadful genetic potential of our local breeds in terms of milk and meat on one hand and the neglect of milking ewes to obtain milk essential for the sheep cheese industry from the other hand.

El-Adely sheep was developed from selected ones of Ossimi and Rahmani breed , followed by selection for twenty years . Inbreeding was also used to fix some favorable genes in the animals of the basic flock. Two strains were produced from this breed. high ovulation rate strain (HORS) and high milk yield strain (HMYS) for higher meat and milk

production, respectively. These two strains of El-Adely sheep have many phenotypic traits like the Ossimi breed. It is hoped to expand the base of these strains to be raised in a vast scale, and to be used as an enhancer to cross with the other local Egyptian sheep breeds under intensive and semi-intensive systems of production aiming to increase mutton in the local meat market and milking ewes to make favorable sheep cheese that is actually imported from abroad. The two strains of El-Adely breed were developed by Adel Said in his farm. (**Mourad, 2008**).

Molecular genetic technologies have changed the pace and dimension of genetic analysis of livestock species. DNA based polymorphisms are being used for marker-assisted selection strategies, parentage testing, species identification, breed characterization and population genetic studies. The advent of RAPD analysis (Randomly amplified polymorphic DNA) by **Williams *et al.* (1990)** provided a tool for the molecular geneticist. Amount of polymorphism observed with RAPD technique is comparable to that of Restriction Fragment Length Polymorphism (RFLP) and microsatellite(SSR) techniques and possibility of converting the RAPD marker of interest into a single locus PCR marker namely SCAR (sequence characterised amplified region) have made a promising technique (**Joshi *et al.*, 1998**).

During the last few years, some molecular studies were carried out using RAPD-PCR technique to detect the diversity in the local and/or adapted sheep and goat breeds in Egypt. The results of these studies demonstrated the usefulness of the RAPD-PCR technique for detecting DNA polymorphism and establishing the relationships among different breeds; Rahmany, Ossimi and Barki sheep breeds (**Ali, 2003**). These studies confirmed the previous conclusions reported by (**Appa Rao *et al.* 1996**) who reported that the RAPD-PCR profile can be effectively used as a supporting marker for taxonomic identification. In taxonomic and molecular systematic, species-specific RAPD markers could be used as an invaluable tool for species variation and establishing the status of organisms and its evolution.

The objectives of present study are:

- 1- Conduction of biochemical and molecular genetic fingerprinting of Ossimi breed and the two strains of El-Adely sheep.
- 2- Calculation of genetic similarity values among the studied groups.
- 3- Calculation of genetic homogeneity percentage within each of the studied groups
- 4- Obtaining specific biochemical and molecular genetic marker for Ossimi breed and the two strains of El-Adely sheep.
- 5- Construction of dendrogram which showed the genetic relationships among Ossimi breed and the two strains of El-Adely sheep.

II.REVIEW OF LITERATURE

Live stock production represent about 30% of the agriculture revenue of the countries of West Asia and North Africa and their products are the main output for areas receiving less than 300mm annual rainfall. The 300 million small ruminants account for a large proportion in this output and represent a significant reserve for the small farmers who predominant in these countries.

1. Sheep breeds in Egypt

The major sheep breeds in Egypt are Ossimi, Rahmani and Barki, which constitute 65% of the total sheep population. Ossimi and Rahmani are the important sheep breeds, although they represent 35% of the total sheep population in Egypt. They are reared in the intensive agricultural zone in Nile Delta of Egypt. Barki is mainly reared in the Western Northern coastal zone of Egypt.

1. 1. Ossimi breed:

Galal (1987) reported that Ossimi is the original sheep breed of Egypt, which is traced to Ossim village in the Giza Governorate of Egypt. Numerically, it is the largest breed constituting one-third of the total sheep population in Egypt. It is a medium size breed. They produce meat (lambs) as die main product and course/carpet wool (usually white in color) as a by-product and it has white body color and red head.

1. 2. Breed characteristics of El-Adely sheep :

Mourad (2008) reported that El-Adely sheep was developed from selected local animals of Ossimi and Rahmani breeds followed by selection for many generations. Inbreeding was also used to fix some favorable genes in the animals of the basic flock. Two strains were produced from this breed. high ovulation rate strain (HORS) and high milk yield strain (HMYs) for higher meat and milk production, respectively, and these two strains had many phenotypic traits like the Ossimi breed.