

**CHARACTERIZATION OF GENETIC RELATIONSHIP
BETWEEN EGYPTIAN AND ITALIAN BUFFALOES
POPULATIONS USING MOLECULAR GENETIC
TECHNIQUES**

By

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**A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Degree of**

**DOCTOR OF PHILOSOPHY
in
Agricultural Sciences
(Genetics)**

**Department of Genetics
Faculty of Agriculture
Ain Shams University**

2022

ABSTRACT

Sarah Gamal Ali Mohamed Al-Azazi; Characterization of Genetic Relationship between Egyptian and Italian Buffaloes Populations Using Molecular Genetic Techniques. Unpublished Ph.D. Thesis, Department of Genetic, Faculty of Agriculture, Ain Shams University, 2022.

Egypt has a significant output deficit in milk and meat, as seen by annual imported milk and meat. Due to the lack of specialized breeds/lines for (meat/milk) and the requirement for national genetic improvement scheme initiatives, Egyptian buffalo production could not cover such a void. As with local cattle crossbreeding, trials for the introduction of foreign breeds of buffalo (crossbreeding with Italian buffalo) were conducted to greatly improve the genetic makeup of Egyptian buffaloes for economic qualities. In this study, the reproductivity, productivity, and milk composition of buffaloes, i.e., a pure Egyptian (PE) line and Egyptian–Italian crossbreeds, were investigated to identify markers for the traits under examination. Ninety-nine dairy buffaloes were used to compare the PE line with the Egyptian–Italian crossbred lines {G1 (25.0%), G2 (50.0%), G3 (62.5%), G4 (75.0%), G5 (87.5%), and G6 (94.0%)} respectively. Analysis of farm data showed a significant increase in all traits for the 94.0% crossbred line when compared with the PE line and other Italian crosses. On a molecular level, all investigated buffaloes were genotyped for BB, which meant they were negative for the SnaBI at position 224[^]225 (TAC[^]GTA) of the IGF-I regulatory region, and they were genotyped AA-positive for the TaqI at position 47[^]48 (T[^]CGA) of IGF-I receptor. In addition, they were positive for the Alu1 restriction site of the leptin gene and gave three products that were 55-, 118-, and 205-bp in length (AG[^]CT). We conclude that directing additional effort toward the genetic improvement of the Egyptian buffalo using crossbreeding with Italian lines may improve these traits. However, more studies are required before crossbreeding activities can be enhanced on a national level.

Keywords: Egyptian buffalo, Egyptian–Italian buffalo, reproductive and productive performance, leptin, insulin-like growth factor and restriction fragment length polymorphism.

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LIST OF ABBREVIATIONS

| ABBREVIATION | Mean |
|---------------------|---|
| AI | Artificial insemination |
| AnGR | Animal Genetic Resources |
| ANASB | Associazione Nazionale Allevatori Specie Bufalfna (Italian Buffalo Breeders Association) |
| bp | Base pair |
| DNA | Deoxyribonucleic acid. |
| DMY | Daily milk yield |
| EDTA | Ethylenediaminetetraacetic acid |
| FAO | Food and Agriculture Organization. |
| FAOSTAT | Food and Agriculture Organization Corporate Statistical Database. |
| g | Gram |
| GH | Growth hormone. |
| IGFs | Insulin-like Growth Factors. |
| IGF-1 | Insulin-like Growth Factor 1. |
| IGF-1R | Insulin-like Growth Factor 1 Receptor. |
| Kbp | Kilo-base pair |
| Kg | Kilogram. |
| KDa | Kilodalton. |
| L | Liter. |
| Mbp | Megabase pair. |
| Mg | milligram. |
| Mg | Microgram. |
| μl | Microliter. |
| μM | Micromolar. |

| | |
|-------|---|
| P4 | Progesterone. |
| PCR | Polymerase chain reaction. |
| RFLP | Restriction Fragment Length Polymorphism. |
| RNase | Ribonuclease. |
| rpm | Revolutions per minute. |
| SA | Somatotropic axis |
| SAS | Statistical analysis system. |
| SNF | Solids not fat. |
| SNPs | Single nucleotide polymorphisms. |
| TMR | Total mixed ration. |
| TMY | Total milk yield. |
| UV | Ultraviolet. |
| VEGF | Vascular endothelial growth factor. |