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

By

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ABSTRACT

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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.