List of Abbreviations

Ab (s)	Antibody / Antibodies
ACTH	Adrenocorticotrophin Hormone
APC	Antigen Presenting Cell
B.	*Bacillus* / *Bacilli*
Bb.	*Bifidobacteria*
BPB	Bromo Phenol Blue
BSA	Bovine Serum Albumin
Bwt	Body Weight
C domain	Constant domain
CD4+	CD4+ T helper cell
CD8+	CD8+ T helper cell
CFa	Complete Fruend's adjuvant
CFM	Concentrate Feed Mixture
CFU	Cell Forming Unit
CH domain	Constant domain of Heavy chain
CL domain	Constant domain of Light chain
CRH	Corticotrophin- Releasing Hormone
DC	Dendretic Cell
DFM	Direct- Fed Microbial
E. coli	*Escherchia coli*
EFSA	European Food Safety Authority
ELISA	Enzyme Linked Immuno-Sorbent Assay
EU	European Union
FAO	Food and Agriculture Organization
FDA	Food and Drug Administration
G	Group
GALT	Gut - Associated Lymphoid Tissue
GIT	Gastro-Intestinal Tract
GRAS	Generally Recognized As Safe
H- chain	Heavy chain
HCAb	Heavy Chain Antibody
HRP	Horseradish Peroxidase
IFa	Incomplete Fruend's adjuvant

IFN-γ	Interferon-gamma
Ig (s)	Immunoglobulin (s)
IL (s)	Interleukin (s)
kDa	Kilo Dalton
L- chain	Light chain
L.	*Lactobacillus*
LAB	Lactic Acid Bacteria
LDL	Low Density Lipoprotein
M - cell	Mast cells
MAMP	Microbial- Associated Molecule Pattern
MLN	Mesentric Lymph Node
mM	milli- Molar
MOS (s)	Mannan Oligosaccharide (s)
Mwt	Molecular weight
ng	1 nanogram (= 0.001 microgram)
Nb (s)	Nanobody/ Nanobodies
NK cell	Natural Killer cell
OD	Optical Density
pAb	Polyclonal Antibody
PAMP	Pathogen-associated molecular pattern
PBS	Phosphate Buffered Saline
pg	1 picograms (= 0.001 nanogram)
PP	Peyer's Patch
PRR	Pattern Recognition Receptor
SAS solution	Saturated Ammonium Sulfate solution
SC	*Saccharomyces cerevisiae*
SDS-PAGE	Sodium Dodecyl Sulfate Polyacrylamide Gel Electrophoresis
SE	Standard Error
sp.	Species
T- reg cell	T regulatory cell
TEMED	Tetra Methelethelene Diamine
TGF-β	Transforming Growth Factor- beta
Th1 cell	T- helper 1 cell
Th2 cell	T- helper 2 cell
TLR	Toll- like Receptor

TNF	Tumor Necrosis Factor
UV	Ultra Violet
V domain	Variable domain
VH domain	Variable domain of Heavy chain
VHH	Variable domain of heavy chain of HCAb
VL domain	Variable domain of Light chain
WBC(s)	White Blood Cell(s)
WHO	World Health Organization
α, β, γ	Alfa , Beta , Gamma
β- Glucan	Beta Glucan
µl	1 microliter (= 0.001 milliliter)
+ ve/ -ve	Positive/ Negative
+1m	One month post-calving
+1w	One month post-calving
-1m	One month pre-calving
-2m	Two months pre-calving

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ABSTRACT

Student name: **Maysoon Mohammad Mohie El-Dinn Ibrahim Makhlouf.**

Title of Thesis: **The Influence of Probiotics on the Immunity and Vitality of Pregnant She-camels during Peri-partum Period and Its Reflection on Their Newborn Calves.**

Degree: **Ph.D. in Zoology (Immunology).**

Pregnancy in dromedary camel is associated with down-regulation of immune responses that may lead to susceptibility to viral and bacterial infections. So, it has been proposed that probiotic application might help in strengthening the immunity and performance of pregnant she-camels and their newborns. A total of 15 dams at late gestation (2 months pre-calving) to one month post-calving were divided into three equal groups: G_1 (control) was fed the basal diet recommended by APRI; G_2 was fed the basal diet supplemented with yeast (0.5 gm/head/day) and G_3 was fed the basal diet supplemented with *Bacilli* mixture (Enhancer1.3, 10 g/head/day). Dams' plasma and milk and calves' plasma were collected at certain durations. Results revealed higher significant maternal body weights (kg) in G_2 and G_3 compared to G_1: at one month pre-calving and one month post-calving. Non-significant changes were detected between the 3 experimental groups at calving. Moreover, calves' birth weights were higher in G_2 and G_3 compared to G_1. The immunological investigation revealed that dams plasma IgG levels (ng/ml) at one month pre-calving, one week and one month post-calving were higher in G_2 and G_3 than G_1. In milk, IgG levels during early lactation showed significant changes between the 3 groups at one week post-calving. For calves, IgG levels showed significant increases in G_2 and G_3 more than G_1 at: birth, one week and one month post-calving. In dams, IgA levels showed non-significant changes in the 3 experimental groups either in plasma or milk. While, in calves, there was a significant increase in G_2 compared to G_3 and G_1, at one month after birth. For IFN-γ: dams, G_2 and G_3 showed significant increases more than G_1 at calving and one week post-calving. IFN-γ levels didn't change over the experimental period between the 3 groups in milk or calves' plasma. The conclusion of this study indicates that the inclusion of Yeast or *Bacilli* mixture-based in the basal diet of dromedary she-camels during the peri-parturation period is effective in improving their body weight and immune responses. Additionally, the maternal health improvement may be reflected on their newborn birth weight and some immune responses. Moreover, Yeast or *Bacilli* mixture may affect IgG levels in Camel's milk. Therefore, we emphasize the inclusion of probiotics in the regular diet of pregnant she-camels in order to enhance their immunity and health, which positively affects the vitality of their newborns. This systemic chain supports the economic value of breeding this great animal.

Keywords: She-camel; Probiotics; Newborn; Immunity; Production performance.

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