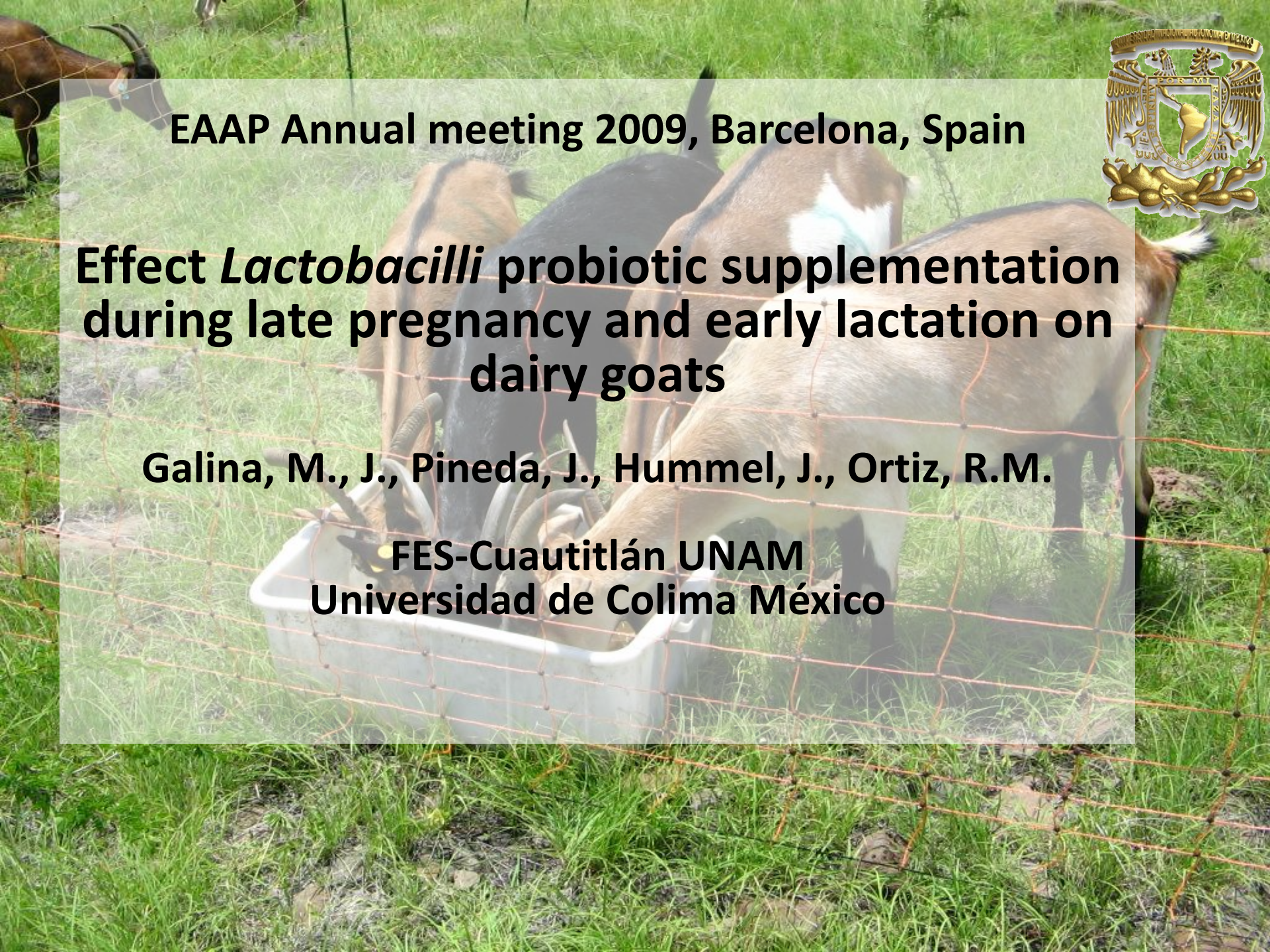

EAAP Annual meeting 2009, Barcelona, Spain

Effect *Lactobacilli* probiotic supplementation during late pregnancy and early lactation on dairy goats

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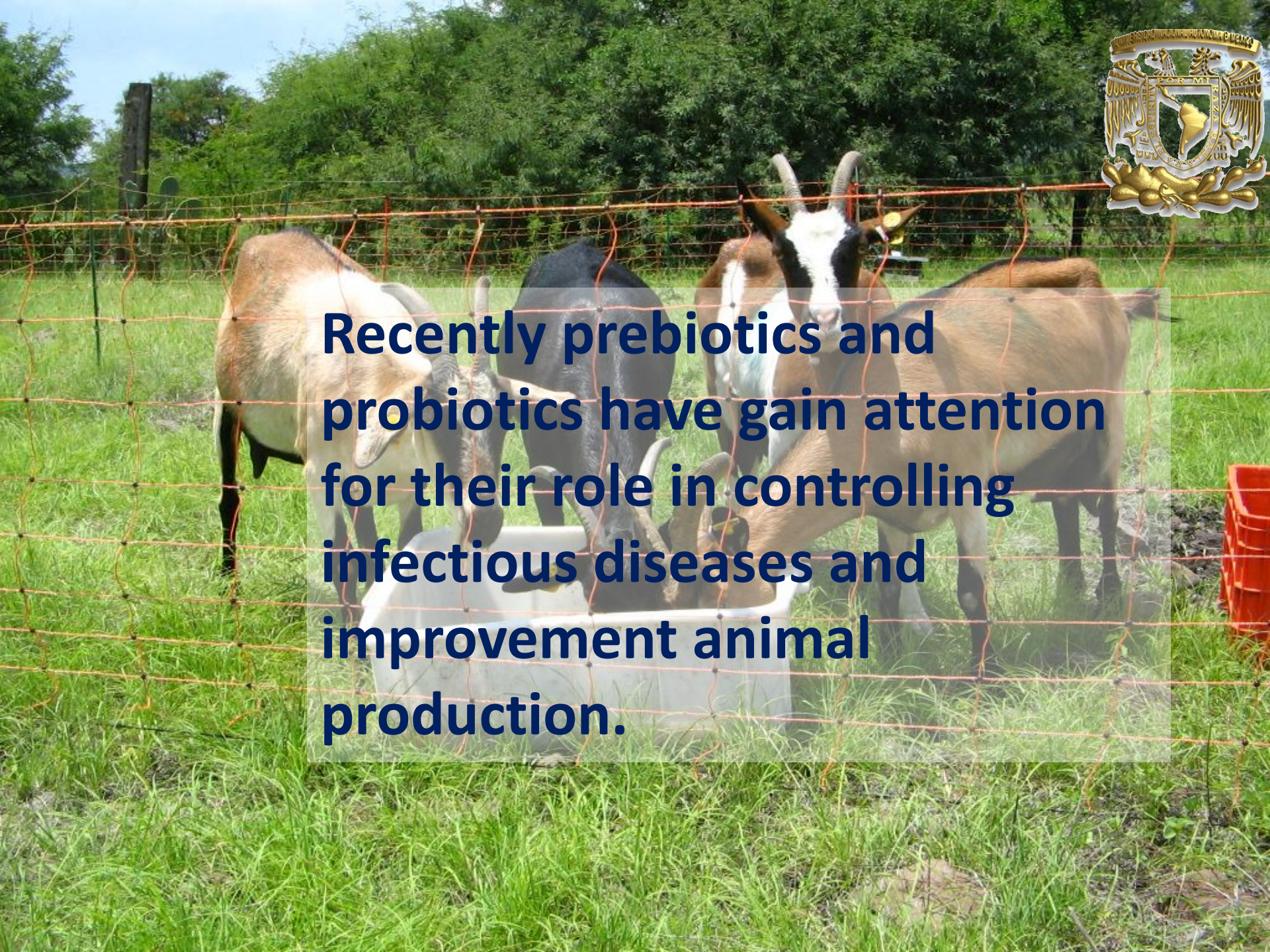
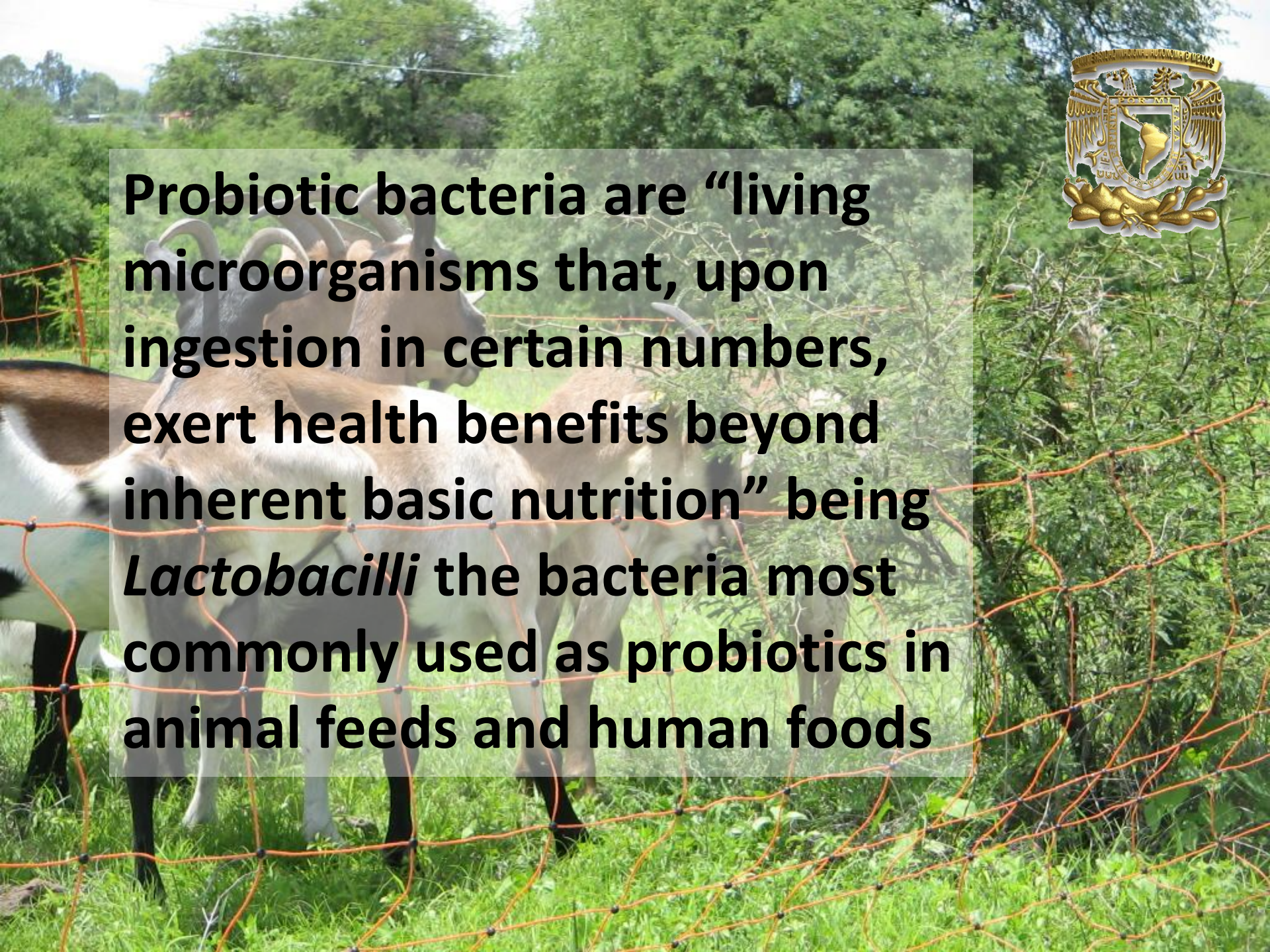
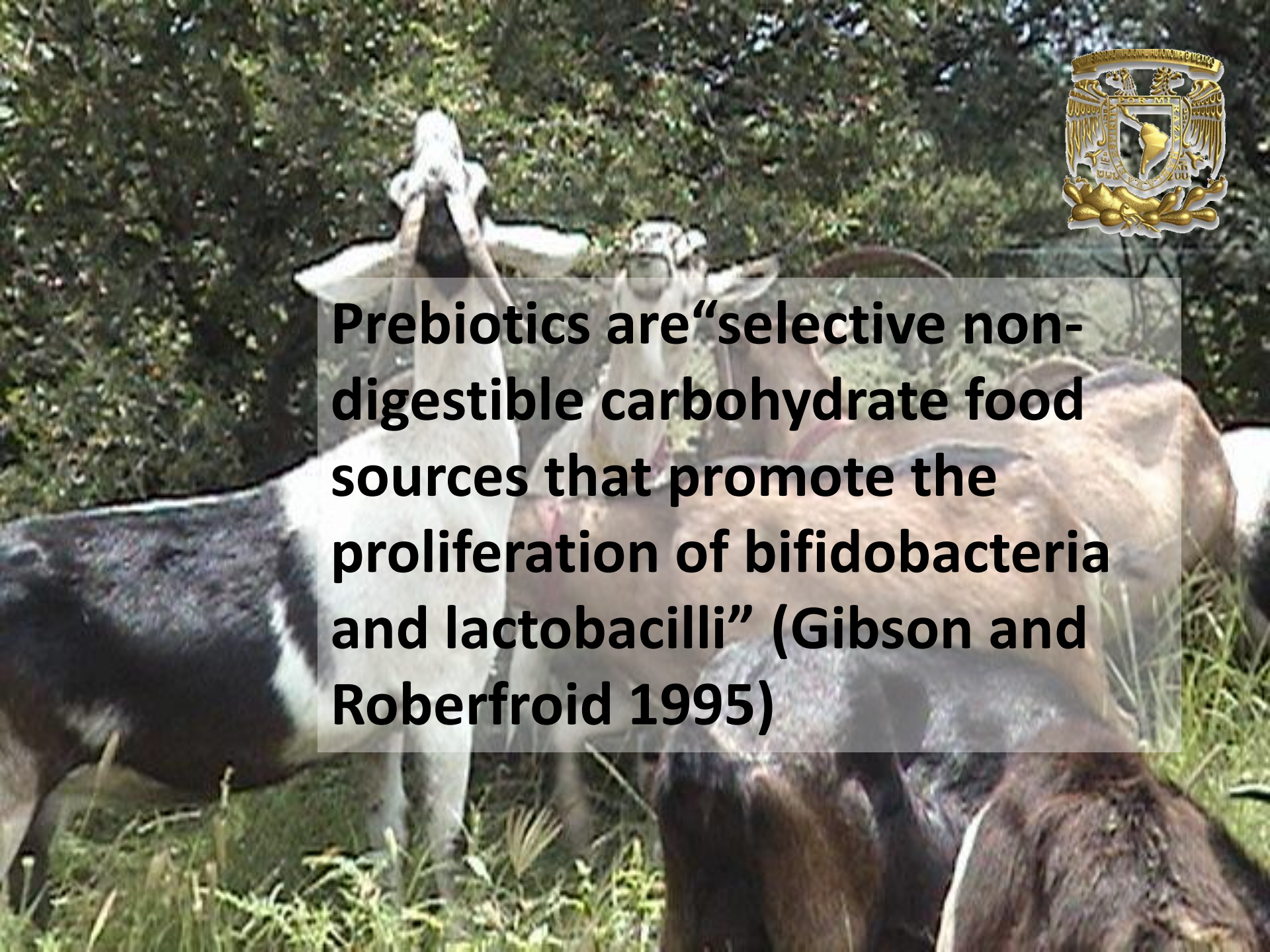


Recently prebiotics and probiotics have gain attention for their role in controlling infectious diseases and improvement animal production.

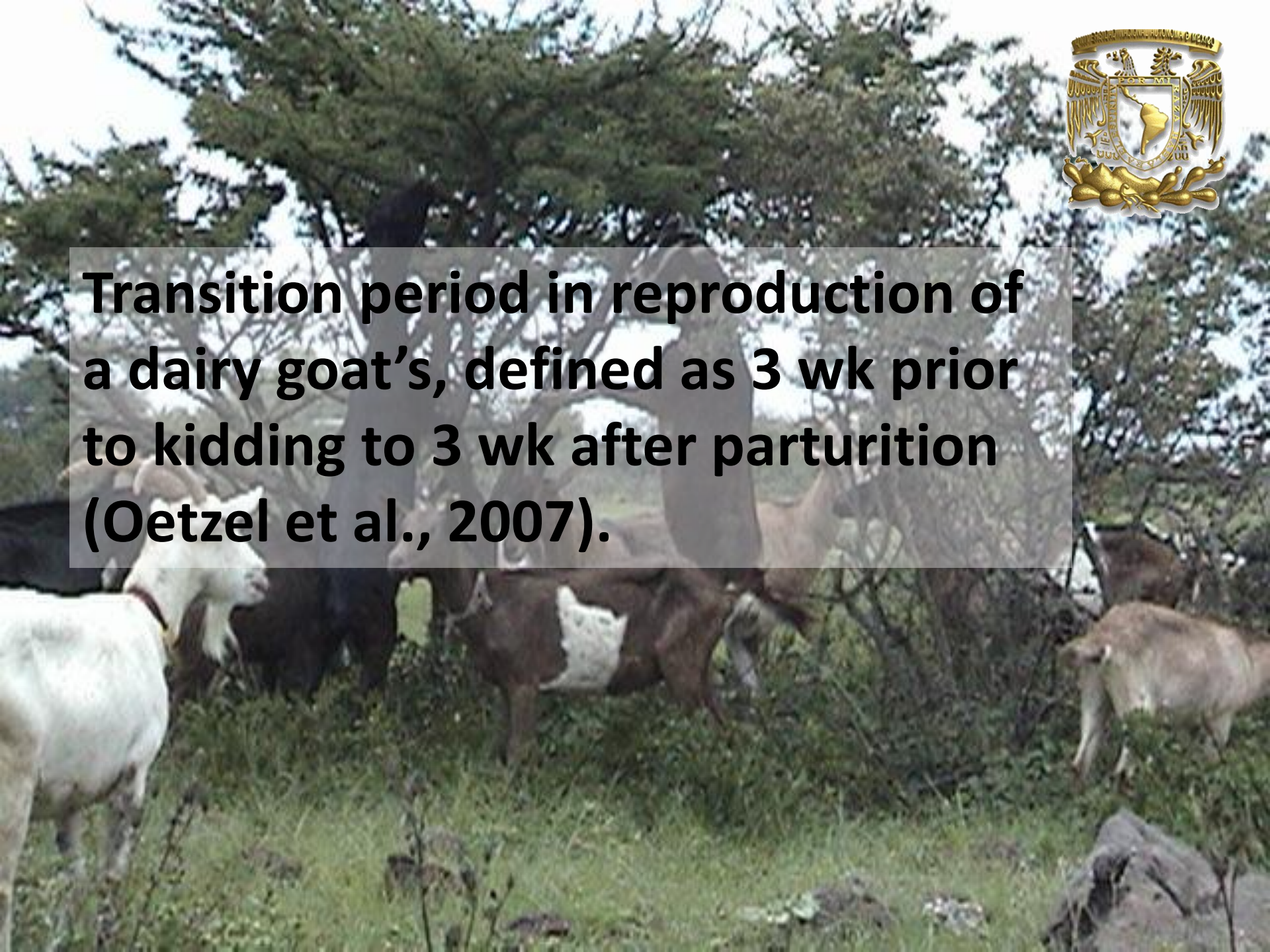


Probiotic bacteria are “living microorganisms that, upon ingestion in certain numbers, exert health benefits beyond inherent basic nutrition” being *Lactobacilli* the bacteria most commonly used as probiotics in animal feeds and human foods

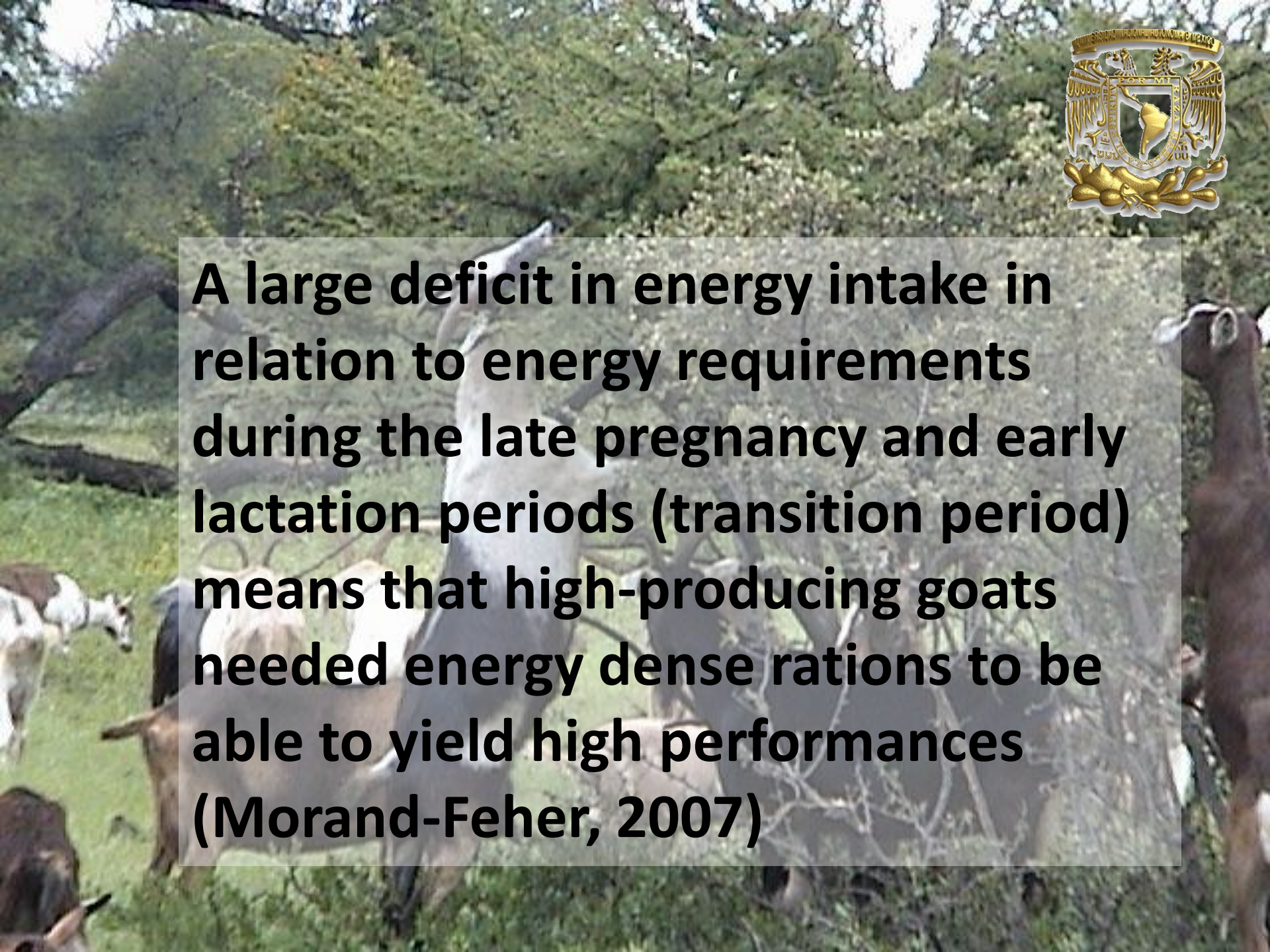


Prebiotics are“selective non-digestible carbohydrate food sources that promote the proliferation of bifidobacteria and lactobacilli” (Gibson and Roberfroid 1995)

More recently the symbiotic effect of probiotic and prebiotic association has been demonstrated (Yasuda et al., 2007)

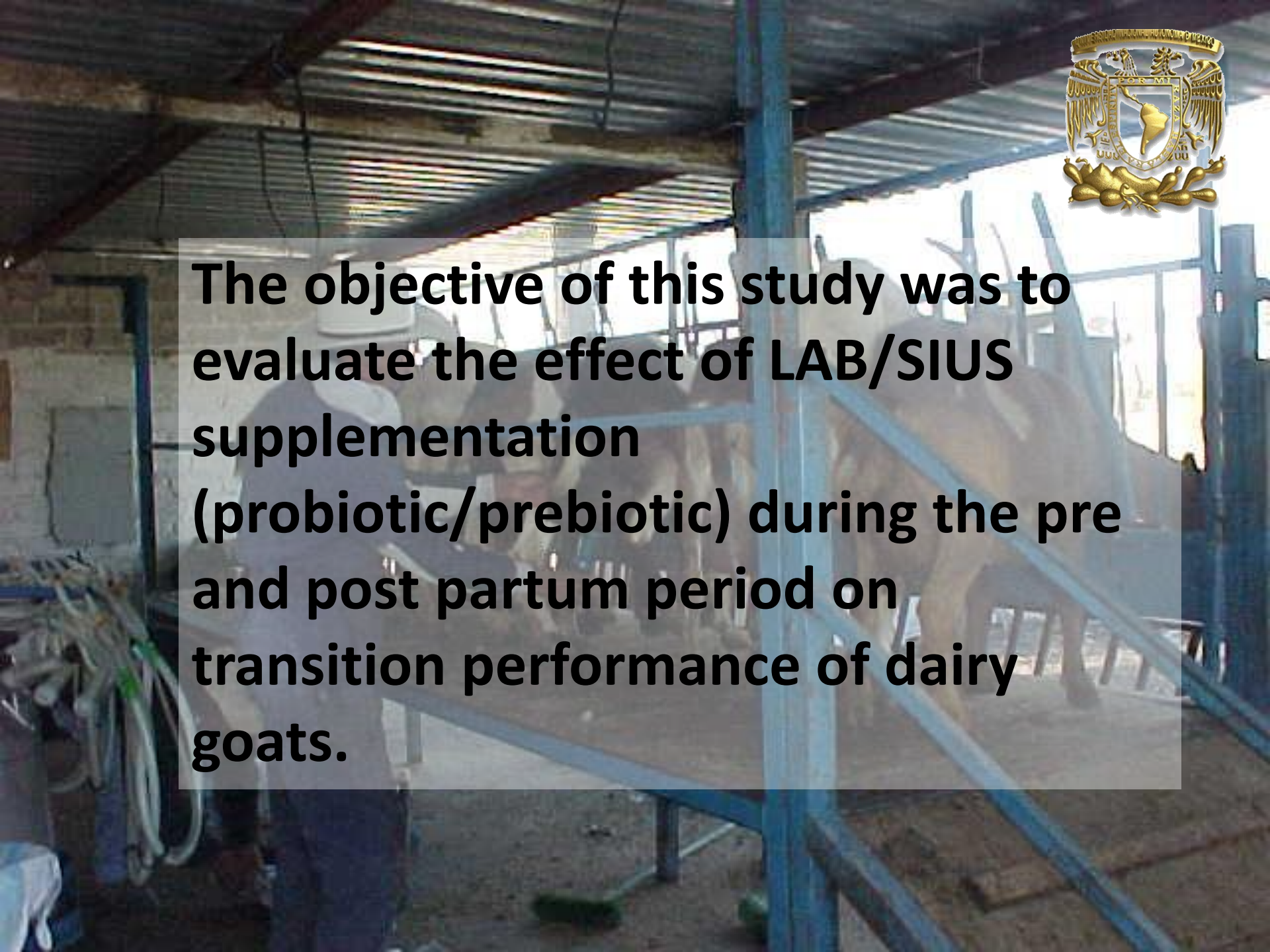


Transition period in reproduction of a dairy goat's, defined as 3 wk prior to kidding to 3 wk after parturition (Oetzel et al., 2007).



A large deficit in energy intake in relation to energy requirements during the late pregnancy and early lactation periods (transition period) means that high-producing goats needed energy dense rations to be able to yield high performances (Morand-Feher, 2007)

Lactic Bacteria (LAB) used as a prebiotic/probiotic mixture have been shown to augment production before and after parturition in dairy cows (Galina et al., 2009) and growing kids (Galina et al., 2009).

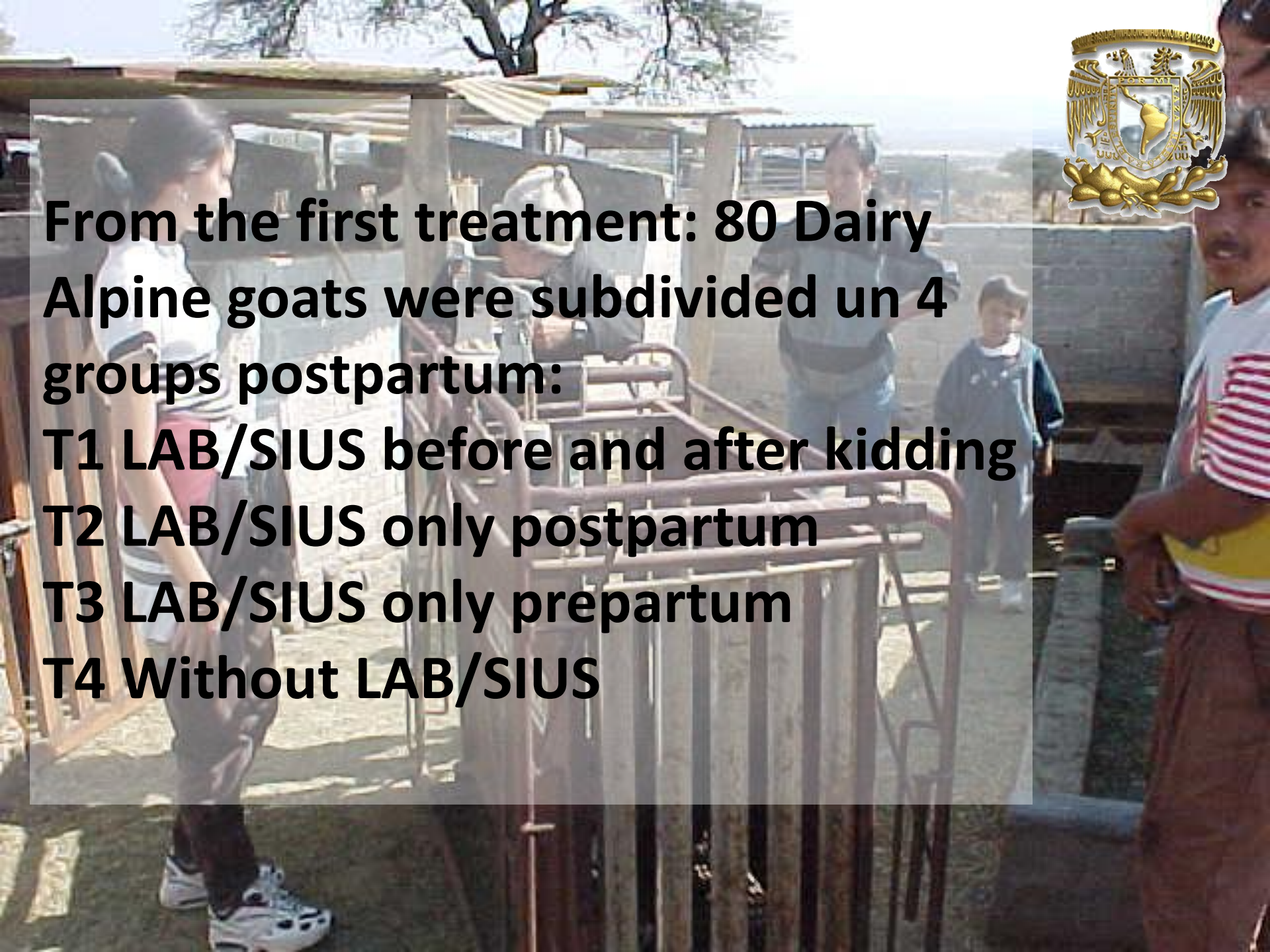


The objective of this study was to evaluate the effect of LAB/SIUS supplementation (probiotic/prebiotic) during the pre and post partum period on transition performance of dairy goats.

Material and Methods:

80 Alpine goats were selected by previous lactation into two treatments from 3 weeks pre partum throughout 10 weeks postpartum.

The treatment groups consisted of two pregnancy diets (with and without SIUS/LAB) offered to two groups of 40 dairy goats each, feed a Pregnancy diet (PD), beginning at 21 d pre partum distributed randomly



From the first treatment: 80 Dairy Alpine goats were subdivided un 4 groups postpartum:

T1 LAB/SIUS before and after kidding

T2 LAB/SIUS only postpartum

T3 LAB/SIUS only prepartum

T4 Without LAB/SIUS

Pre partum diets offered last month of gestation
*SIUS/LAB substitutes cotton seed

	Pre partum diet	Pre partum diet with SIUS/LAB
Ingredients	DM %	DM %
SIUS/LAB		10.40
Cotton seed	10.40*	
Corn ground	35.40	35.40
Soya meal	11.40	11.40
Alfalfa hay	42.00	42.00
Minerals	0.80	0.80
CP %	19.9	21.1
DIP % of CP	69.0	72.0
NDF %	33.4	31.4
Ca %	1.28	1.21
P %	0.52	0.57
Mg %	0.38	0.40

Postpartum diets offered last month of gestation
*SIUS/LAB substitutes cotton seed

	Post Partum Diet	Post Partum Diet with SIUS/LAB
Ingredient	% DM basis	% DM basis
SIUS + LAB Probiotic		9.04
Cotton seed	9.04*	
Ground shell corn	23.11	23.11
Soya meal	14.51	14.51
Alfalfa hay	52.10	52.10
Minerals	1.24	1.24
CP %	20.2	21.2
UIP % of CP	43.4	45.4
NE_t Mcal/kf	1.89	1.94
ADF %	17.4	16.2
NDF %	30.2	31.5
NFC %	40.5	41.5
Fat %	4.3	4.4
Ca %	1.5	1.7
P %	0.5	0.6
Mg %	0.4	0.5

LAB Probiotic supplementation contained approximately 4 x 10^7 cfu of lactic bacteria composed with:

4 x 10^6 cfu of *Lactobacilli, plantarum*;

10 x 10^6 cfu of *Lactobacilli delbrueckii*;

8 x 10^6 cfu *L. helvaticus*;

10 x 10^6 cfu *Lactoccocus lactis*;

10 x 10^6 cfu *Leuconostoc mesenteroides;*

5 x *10^4* cfu of *Bifidus spp.*

spread on a liquid supplement mixture of 35% molasses, and 65% cheese whey, 150 g supplement/goat per day in both pre partum and post partum period were spread into the feed.

SIUS composition was:
17% corn,
17% molasses,
16% poultry litter,
14% rice polishing,
8% cottonseed meal,
5% animal lard,
4% fish meal,
4% salt,
4% urea,
3.2% calcium carbonate,
3% orthophosphate,
2.2% ammonium sulfate,
1.6% cement kiln dust,
1% mineral salt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Results

Dry matter intake, plasma concentration of BHBA and NEFA of goats, prepartum supplemented with probiotics.

	Days Prepartum					
	21 throughout 8 d			Last 7 d		
Parameter	Control	LAB/SIUS	SEM	Control	LAB/SIUS	SEM
DMI kg/d	880 g[b]	1120g [a]	0.7	810g[c]	920g[c]	0.8
BHBA µ M/L	0.480[b]	0.478[b]	0.214	0.568[a]	0.666[a]	0.017
NEFA µ M/L	315[b]	328[b]	14	396[a]	432[a]	27

[a,b] Effect of period values in the same row with different superscripts are different (P<0.05)

Table 4 Ruminal pH, VFA and NH_3 with different post partum times for goats supplemented with or without SIUS and LAB

	Days Prepartum				
Treatment	14 to 10 d	5,4,3 d	2 d	1 d	SEM
Ruminal pH					
Control	6.3[a]	6.2 [a]	6.2[a]	6.2[a]	0.07
LAB/SIUS	**6.3[a]**	**6.4[b]**	**6.4[b]**	**6.6[b]**	**0.03**
Rumen VFA proportions (mM/l) Control					
Acetate	79.2 [a]	75.2 [a]	74.8 [a]	73.2 [a]	2.3
Propionate	13.4 [b]	16.8 [a]	18.2 [a]	17.9 [ab]	1.2
Butyrate	5.3 [a]	6.2 [a]	6.4 [a]	6.4 [a]	0.5
Total	97.9 [b]	98.2 [c]	99.4 [a]	98.5 [ab]	1.2
Rumen VFA proportions (mM/l) LAB/SIUS					
Acetate	77.3 [a]	73.4 [a]	72.3 [a]	74.5 [a]	2.3
Propionate	15.7[a]	18.1[b]	19.7[b]	18.3[b]	1.2
Butyrate	5.1 [a]	5.9 [a]	5.9 [a]	6.1 [a]	0.5
Total	98.1 [a]	97.4 [b]	97.9 [a]	98.9 [c]	1.2
Rumen NH_3 (mg/100ml)					
Control	14.7[b]	14.5[b]	15.7[b]	15.9[b]	1.7
LAB/ SIUS Probiotic	14.9[a]	17.4[a]	18.2[a]	18.3[a]	2.2

[a,b] Means in the same row with different superscript are significantly different($P<0.05$)

[a,b] Means in the same column for ph and NH_3 values with different superscript are significantly different ($P<0.05$)

Dry matter intake and production parameters for Dairy Goats with or without LAB/SIUS as a probiotic post partum [a]

	Lactation				
Variable	T1	T2	T3	T4	SEM
DMI g/d					
1-7 d	1210[a]	1200[a]	1110[b]	1000[b]	0.9
8 – 21 d	1930[a]	1600[a]	1340[b]	1200[b]	1.1
22 -70 d	2420[a]	1900[a]	1780[b]	1750[b]	0.8
Milk, kg/d					
1-7 d	1.690[a]	1.600[a]	1.590[b]	1.500[b]	0.4
8 – 21 d	2.450[a]	2.150[a]	2.120[a]	1.800[b]	0.6
22 -70 d	2.980[a]	2.400[b]	2.340[b]	1.950[c]	0.5
Milk fat %					
1-7 d	4.64 [a]	4.55 [a]	4.44 [a]	4.35 [a]	0.02
8 – 21 d	4.87 [a]	4.77 [a]	4.44 [b]	4.40 [b]	0.03
22 -70 d	4.95 [a]	4.85 [a]	4.42 [b]	4.48 [b]	0.06
Milk protein %					
1-7 d	4.24[a]	4.14[a]	3.92 [a]	3.90 [a]	0.01
8 – 21 d	4.36[a]	4.26[a]	3.33[b]	3.70[b]	0.05
22 -70 d	4.28[a]	4.22[a]	3.12[b]	3.25[b]	0.10

[ab] Means in the same row with different superscripts differ (P<0.05)

T1= LAB/SIUS pre and postpartum

T2= LAB/SIUS postpartum

T3= LAB/SIUS prepartum

T4= No LAB/SIUS

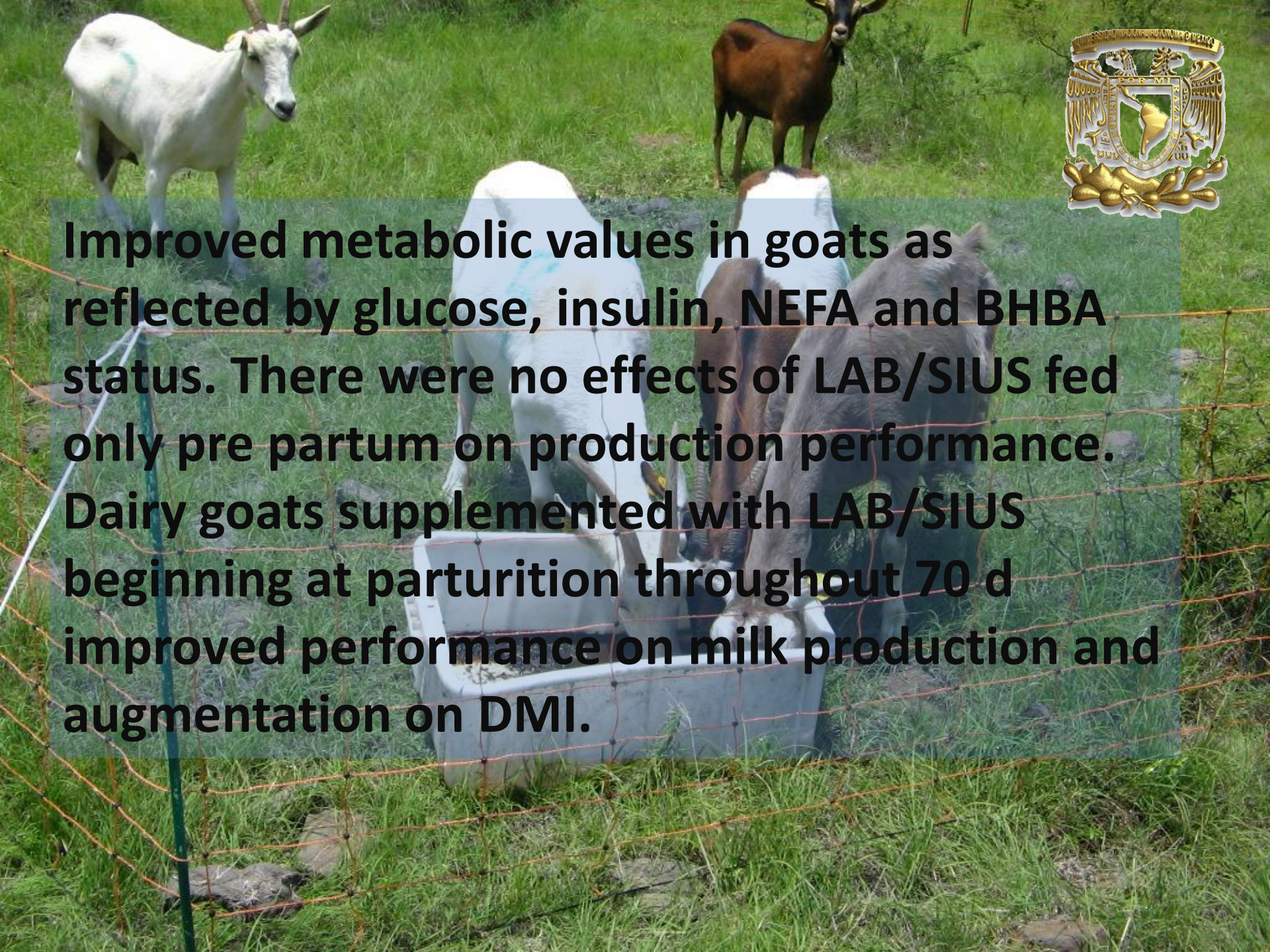
Blood parameters for goats supplemented with or without LAB/SIUS as a probiotic both pre and post partum

	Prepartum			Postpartum			
Variable	**Control**	**LAB/SIUS**	**T1**	**T2**	**T3**	**T4**	**SEM**
Glucose mg/dl							
1-7 d	**47.6^{b}**	**51.6^{a}**	**61.4^{a}**	**58.3^{a}**	**57.3^{a}**	**52.5^{b}**	**3.9**
8 – 21 d	**50.6^{b}**	**56.4^{a}**	**64.3^{a}**	**54.1^{a}**	**52.1^{a}**	**49.1^{b}**	**2.1**
22 -70 d	**51.3^{b}**	**59.2^{a}**	**63.2^{a}**	**57.2^{a}**	**56.4^{a}**	**50.8^{b}**	**2.8**
Insulin µIU/ml							
1-7 d	**11.2^{c}**	**14.1^{a}**	**12.3^{b}**	**11.7^{b}**	**11.4^{b}**	**11.8^{c}**	**1.7**
8 – 21 d	**11.4^{c}**	**18.4^{a}**	**22.2^{b}**	**21.1^{b}**	**21.0^{b}**	**17.4^{c}**	**2.2**
22 -70 d	**18.2^{c}**	**24.3^{ab}**	**28.3^{a}**	**27.3^{a}**	**27.3^{a}**	**24.5^{b}**	**0.8**
BHBA µM/L							
1-7 d	**0.63^{b}**	**0.61^{b}**	**0.60^{b}**	**0.65^{a}**	**0.62^{a}**	**0.75^{a}**	**0.04**
8 – 21 d	**0.85^{a}**	**0.75^{b}**	**0.81^{a}**	**0.78^{a}**	**0.81^{a}**	**0.88^{a}**	**0.02**
22 -70 d	**0.92^{a}**	**0.77^{b}**	**0.87^{a}**	**0.82^{ab}**	**0.85^{ab}**	**0.92^{ab}**	**0.06**
NEFA µM/L							
1-7 d	**590^{a}**	**501^{c}**	**518^{b}**	**516^{b}**	**530^{b}**	**533^{a}**	**45**
8 – 21 d	**615^{a}**	**575^{b}**	**561^{b}**	**550^{b}**	**600^{a}**	**623^{a}**	**43**
22 -70 d	658^{a}	535^{b}	590^{b}	590^{b}	**610^{a}**	640^{a}	48

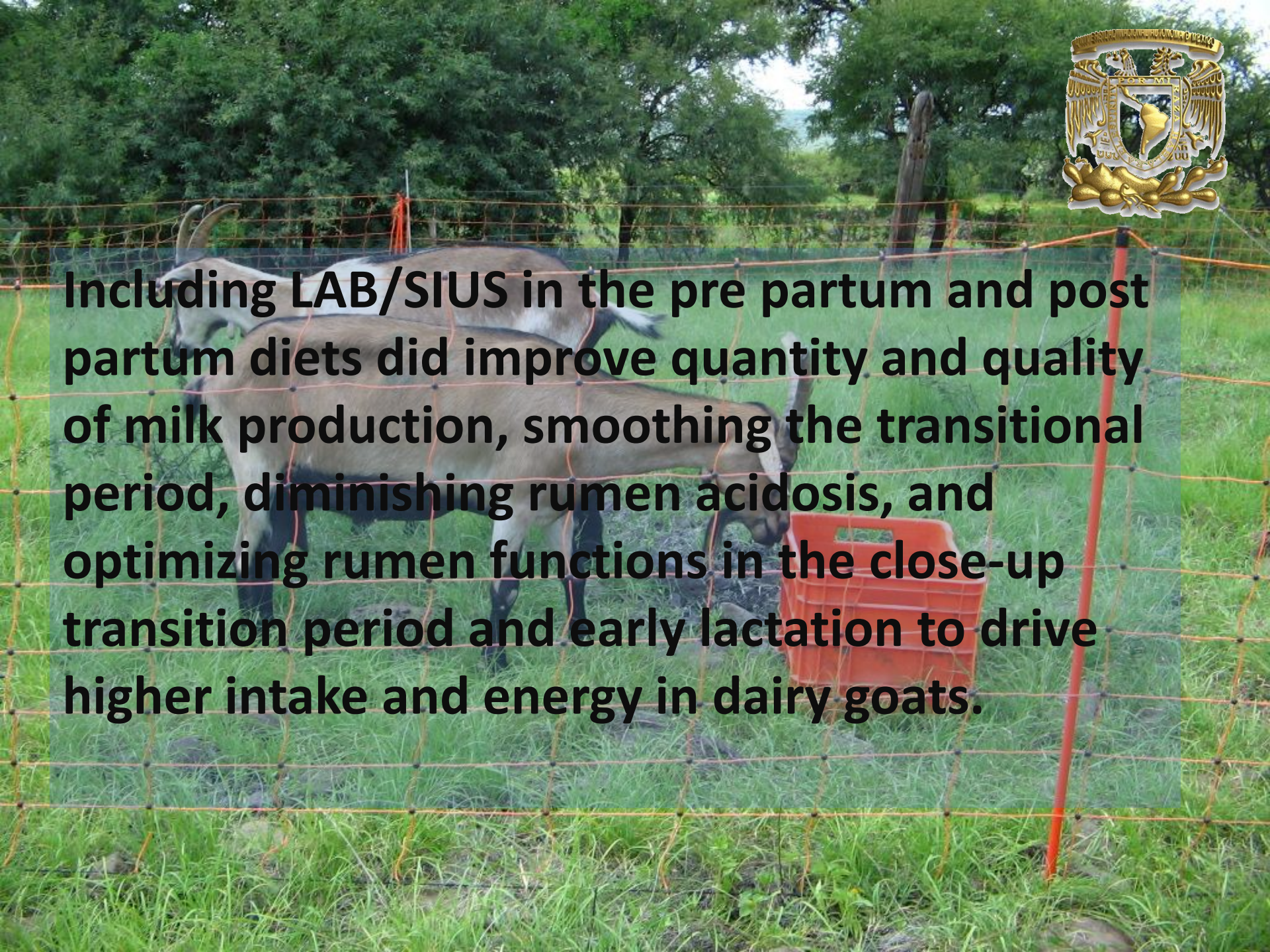
^{ab} Means in the same row with different superscripts differ (P<0.05)

T1= LAB/SIUS pre and postpartum; T2= LAB/SIUS postpartum ,;T3= LAB/SIUS prepartum;T4= No LAB/SIUS

Feeding LAB/SIUS containing a probiotic/prebiotic in the diet ease the transitional period 21 d pre partum throughout 70 d of early lactation increased DMI, milk production, milk fat and milk protein percentage throughout early lactation.



Improved metabolic values in goats as reflected by glucose, insulin, NEFA and BHBA status. There were no effects of LAB/SIUS fed only pre partum on production performance. Dairy goats supplemented with LAB/SIUS beginning at parturition throughout 70 d improved performance on milk production and augmentation on DMI.



Including LAB/SIUS in the pre partum and post partum diets did improve quantity and quality of milk production, smoothing the transitional period, diminishing rumen acidosis, and optimizing rumen functions in the close-up transition period and early lactation to drive higher intake and energy in dairy goats.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