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Institut National de la Recherche Agronomique

Session 22b



Light treated bucks induce a well synchronized estrus and LH peak during anestrus season by male effect in North Moroccan goats

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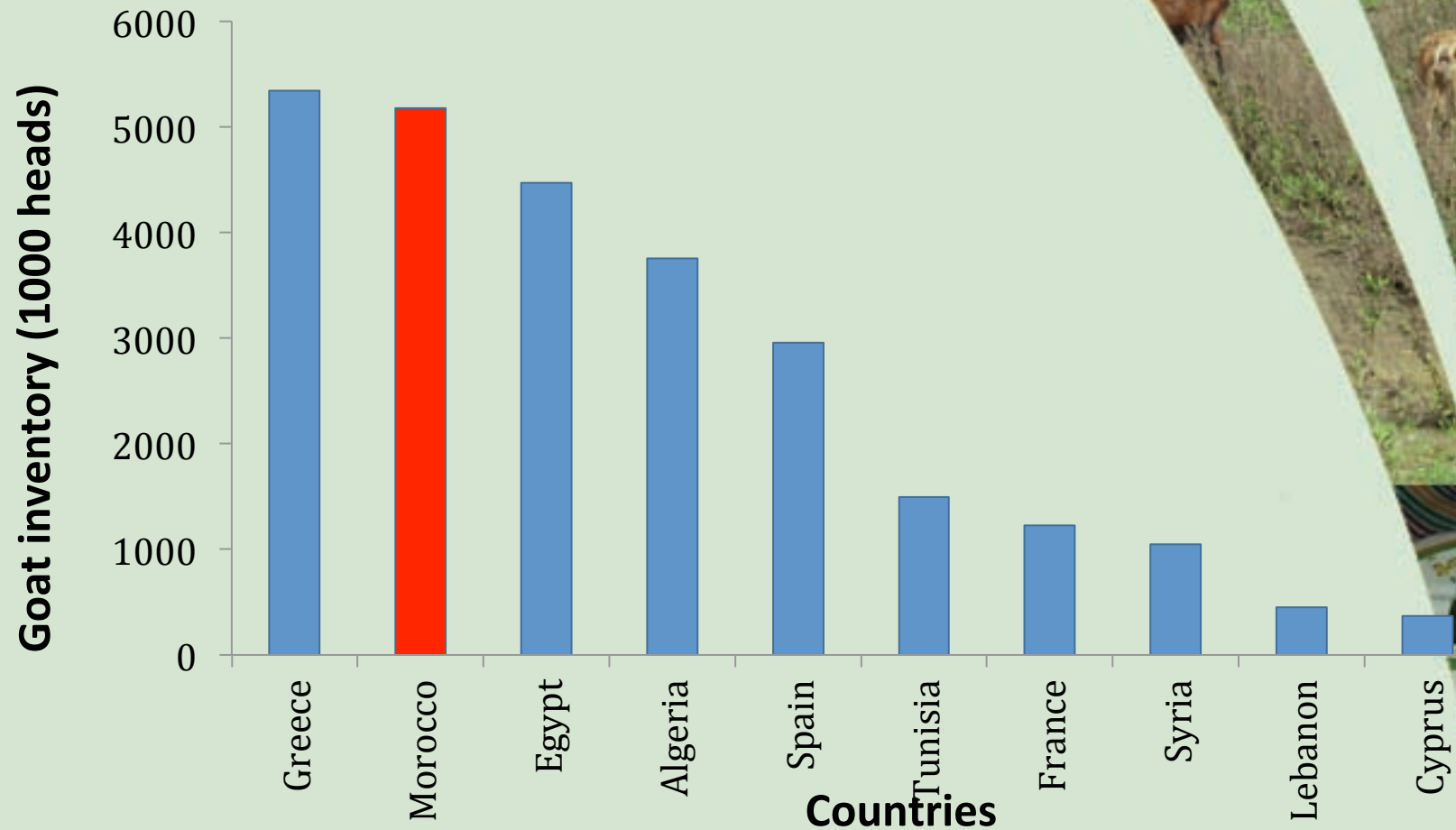
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Goat inventory in Mediterranean countries



FAOSTAT (2008)

North of Morocco: Tangier – Tetouan region



- Area: 12580 km²: 80% mountains and 20% plain;
- Population: 2,7 Millions.
- Goats inventory: 788.000 heads;
- 43% of ruminants;
- 80% of breeders' income.

Goats production system: Low productivity and profitability

- Extensive production system:
 - Meat
 - Productivity: at 90 days, 9.2 kg LW/female
 - Gross margin: 12 €/doe
- Semi extensive production system:
 - Meat and milk
 - Productivity/female:
 - 200 kg of milk/lactation
 - at 90 days, 14.2 kg LW
 - Gross margin: 68 € /doe



Goats production system: Low productivity and profitability

- The improvement of genetic potential of animal is to be implemented;
- Artificial insemination allows the diffusion of caprine semen with high genetic value;
- A caprine artificial insemination center will be created in the North of Morocco in the framework of “Green Morocco plan”.

Hormonal treatment for artificial insemination

- Intra-vaginal progestogens (FGA): D0;
- Injection of eCG and synthetic PGF2 α (Cloprostenol): D9;
- Sponge removal: D11;
- Insemination at fixed time: 43 h after sponge removal.

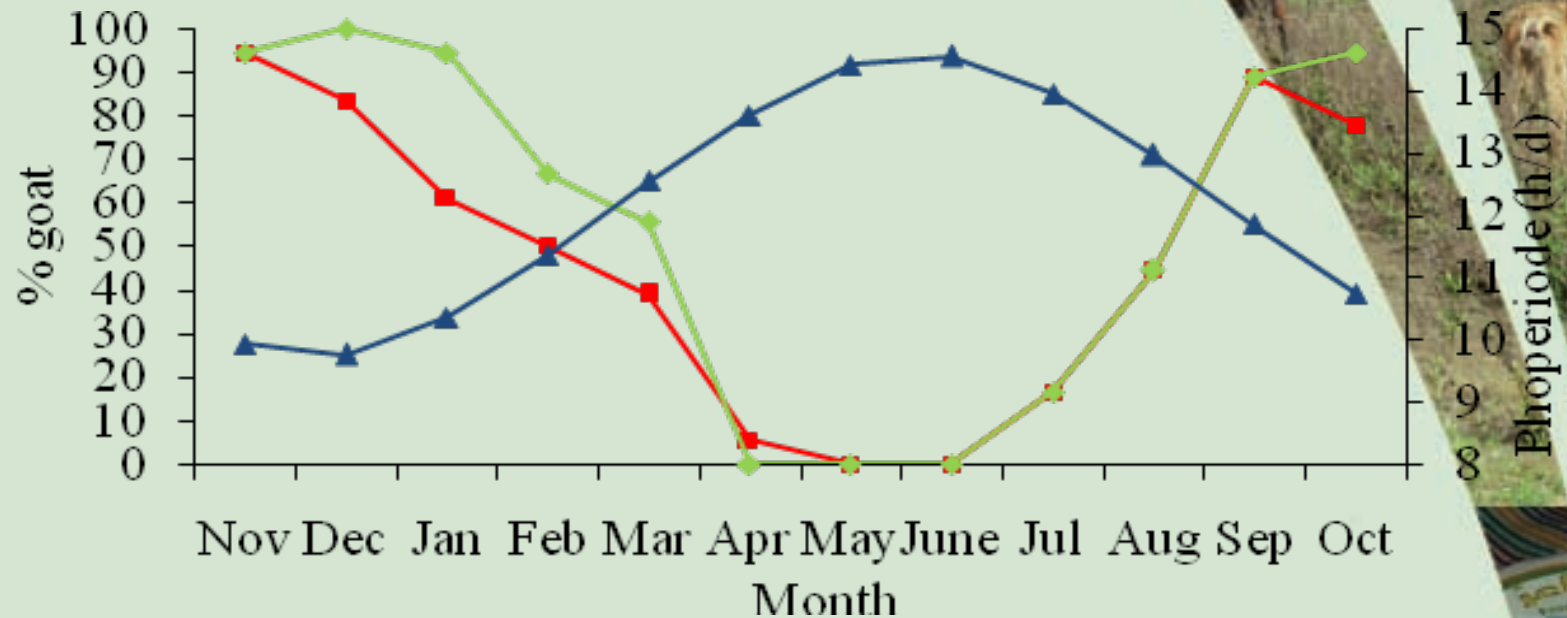
Constraints

- Repeated eCG treatment induce eCG antibodies production that reduces fertility;
- Obligation to minimize or completely avoid the use of synthetic chemicals and hormone;
- Welfare of animals.

Objective

To Study the efficiency of buck effect for the induction and synchronization of reproductive activity in North Moroccan goats during seasonal anestrus.

Female reproductive seasonality of North Moroccan goat



Fluctuations in photoperiod (▲) and monthly distribution of ovulations (◆) and estrus (■) in North Moroccan goats

Chentouf et al. (2011)

Buck reproductive seasonality in North Moroccan goats

		Autumn	Winter	Spring	Summer
Testis measurement	Scrotal circumference (cm)	24.0 ^c	24.3^c	26.3 ^b	27.7^a
	Testicular diameter (cm)	5.0 ^b	4.6^c	5.3 ^b	5.6^a
	Testicular length (cm)	8.8 ^a	7.7^b	8.1 ^b	9.0^a
Semen production	Ejaculate volume (ml)	0.85 ^a	0.44^b	0.82 ^a	0.92^a
	Concentration (10 ⁹ /ml)	2.79 ^b	1.89^c	3.61 ^a	3.43^{ab}
	Sperm produced (10 ⁹)	2.42 ^b	0.80^c	2.98 ^{ab}	3.18^a
Testosterone secretion	Plasmatic testosterone (ng/ml)	9.2 ^a	2.0^b	3.8 ^b	14.2^a

a, b, c Values in the same row with different letters differ significantly. (P < 0.05)

Chentouf et al. (2011)

MATERIAL & METHODS

- Twenty one non cyclic does treated for 11 days with intra-vaginal sponge impregnated with 45 mg of Fluorogestone acetate (FGA) were joined to bucks (Chronogest®, Intervet);
- At the end of the treatment, on 16 April, animals were randomly assigned to three groups LTB (Light treated buck, n=7), LMTB (Light and melatonin treated buck , n=7) and C (Control, n=7)

MATERIAL & METHODS

- LTB: Buck subjected to artificially long days between November 1 and January 15 followed by natural day light;
- LMTB: At the end of long days treatment, Buck received two melatonin implants (Melovine®, Ceva, 18mg);
- C: Buck was submitted to natural photoperiod.

MATERIAL & METHODS

- Long days were provided using the flash method in open barns and artificial light was given from 06:00 to 09:00 and from 22:00 to 24:00;
- At the buck introduction, estrus was checked every 4 hours and blood sampled every 2 hours during 48 hours from heat detection for the determination of plasmatic level of LH by ELISA kit (LH-DETECT®, Repropharm).

Occurrence of estrus and LH peak

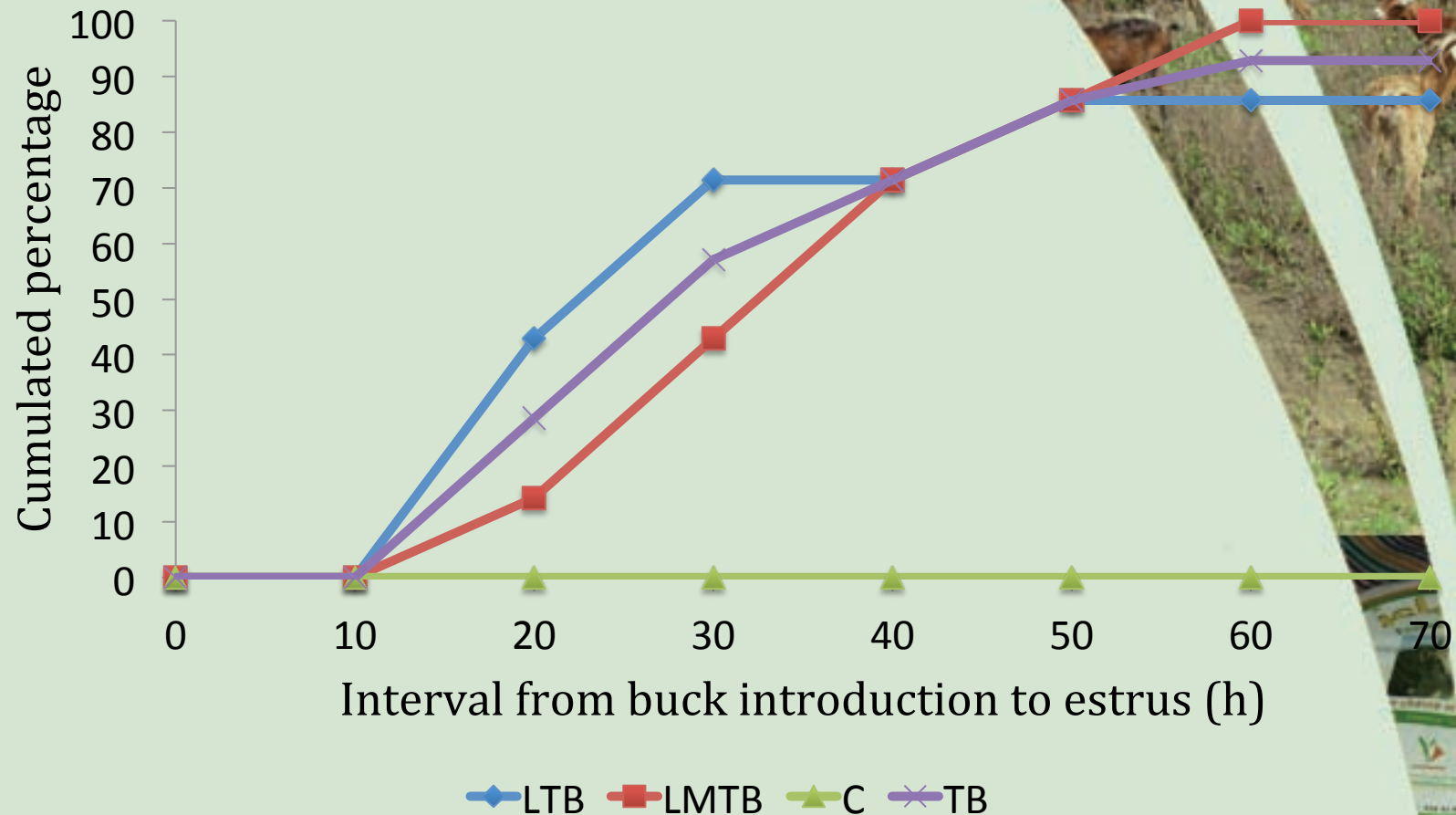
	% Estrus	BI - Est	% LH peak	BI - LH peak	Est - LH	Int BI - Ov*
LTB	100	33.5 ± 10.3	85.7	55.0 ± 13.5	21.5 ± 13.9	77
LMTB	100	44.8 ± 13.0	85.7	61.3 ± 12.3	17.2 ± 6.3	83
TB	100	39.6 ± 12.7	85.7	58.2 ± 12.7	19.3 ± 10.3	80
C	0	-	0	-	-	-

* Estimated in basis of LH peak occurrence

LTB: Light treated buck, LMTB: Light and Melatonin Treated Buck,

TB: Treated buck=LTB+LMTB, C: Control

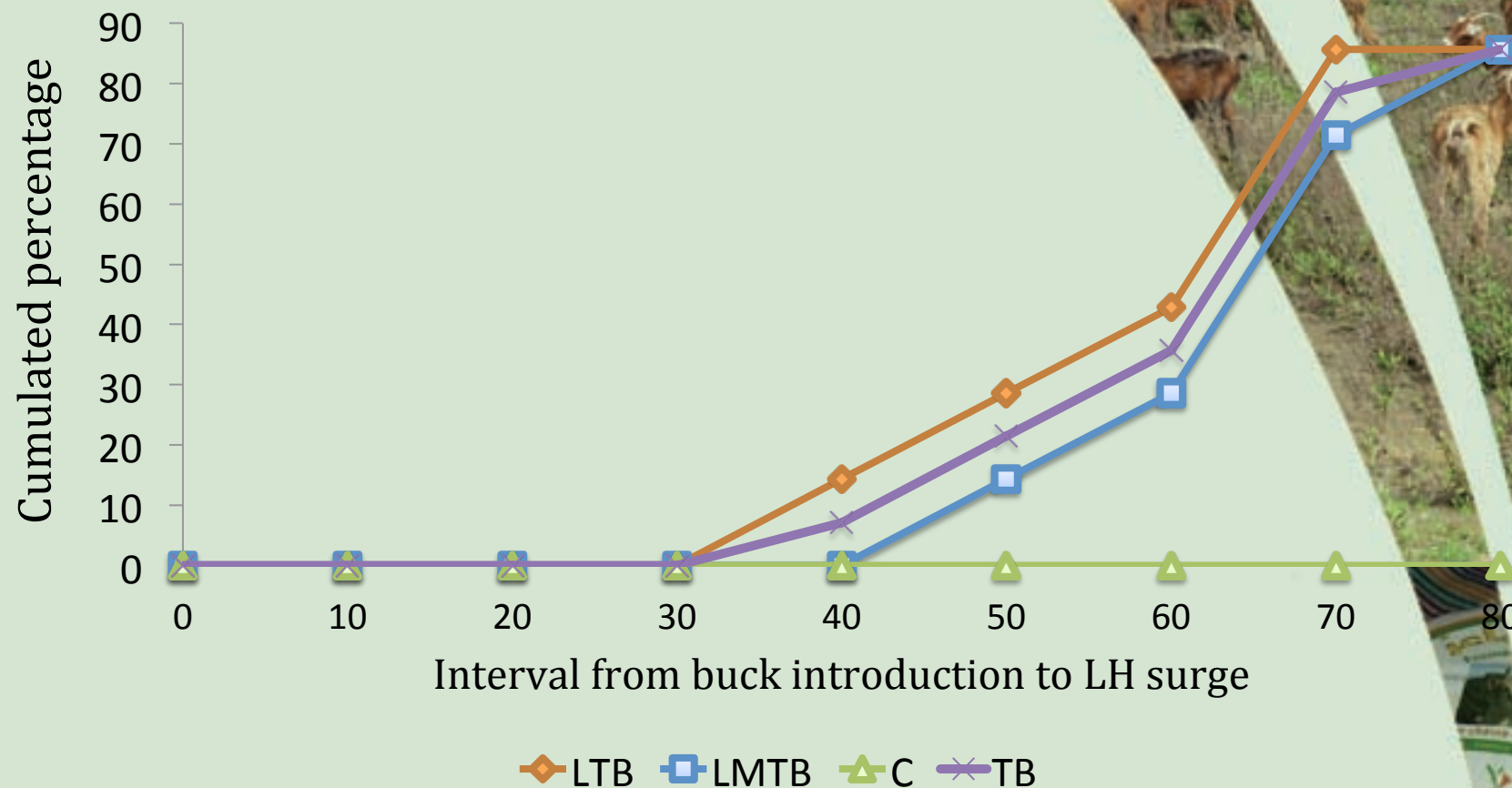
Cumulated percentage of goats displaying estrus after introduction of buck



Goat exhibited estrus behavior during 41 hours period:
26 to 67 hours after buck introduction

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Cumulated percentage of goats displaying LH surge after buck introduction



Goats exhibited LH surge during 40-hour period :
38 to 78 hours after buck introduction

Estrus and ovulation synchronization

- Goat exhibited estrus behavior during 41-hour period: 26 – 67 hours after buck introduction;
- Goats displayed LH surge during 40-hour period : 38 – 78 hours after buck introduction (50 – 70 hours, 67%);
- Ovulation took place: 60 – 100 hours after buck introduction (72 – 92 hours);
- Consistent with two AI: 65 hours and 90 hours after buck introduction and sponge withdrawal.

Reproductive performance

	Kidding Rate	Prolificacy	Buck introduction - Kidding
Light Treated Buck	71.4	1.5 ± 0.5	151.0 ± 3.8
Light and Melatonin Treated Buck	85.7	1.6 ± 0.5	150.0 ± 1.8
Treated Buck	78.5	1.5 ± 0.5	150.5 ± 3.8

Conclusions and implications

- At experimental level, light treated bucks (not untreated), can induce well synchronized estrus and ovulation in anestrus female by male effect in North Moroccan goats in the middle of seasonal anestrus;
- This synchronicity is compatible with two artificial inseminations 65 and 90 hours after buck introduction;
- These results must be validated by artificial insemination at farm level.

Aknowledgments

The experiment was performed in the frame of a project founded by the Belgian Technical Cooperation (Fonds de recherche appliqué Belge: *Etude du potentiel de production de l'élevage caprin au Nord du Maroc et proposition de voies de développement durable* »)