EAAP 2009
60th Annual Meeting of the European Federation of Animal Science
Fira de Barcelona. Barcelona, Spain. August 24-27, 2009

Effects of suckling restriction and parity on metabolic and reproductive function of autumn-calving beef cows

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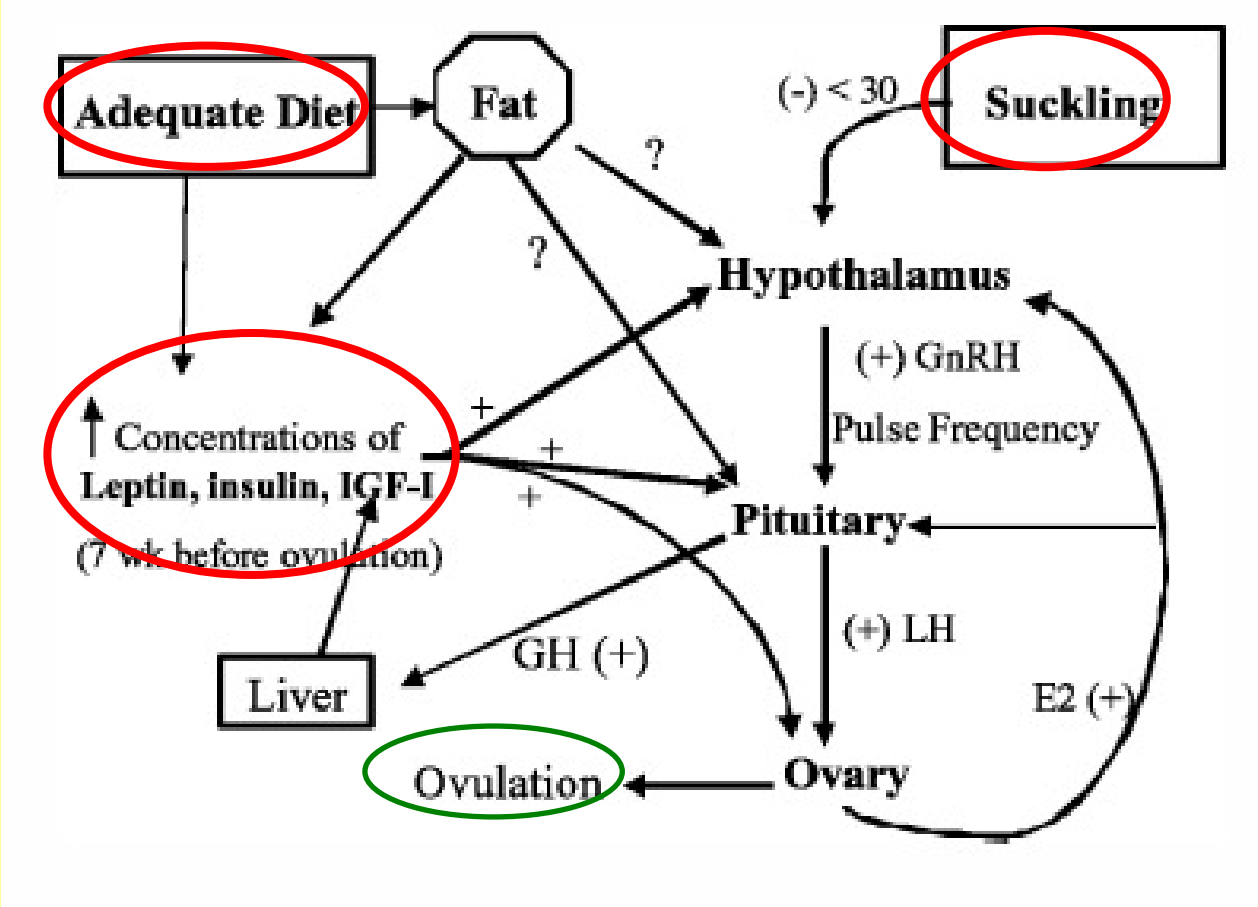
60th EAAP Annual Meeting, 24-28 August 2009

Factors affecting post-partum reproductive physiology



Major effects:

1. **Nutrition**
2. **Suckling**

(Wettemann *et al.*, 2003)

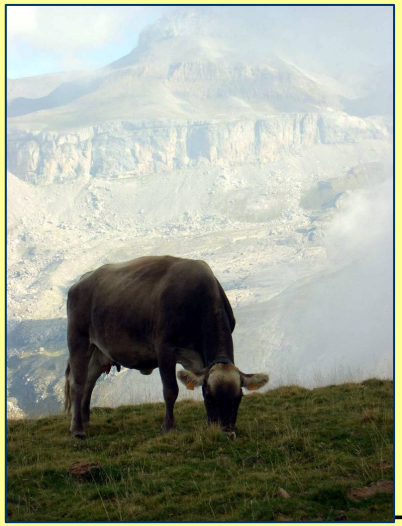
OBJECTIVES

- **To evaluate the effect of nursing frequency and parity on productive, metabolic and reproductive parameters of Parda de Montaña beef cows.**

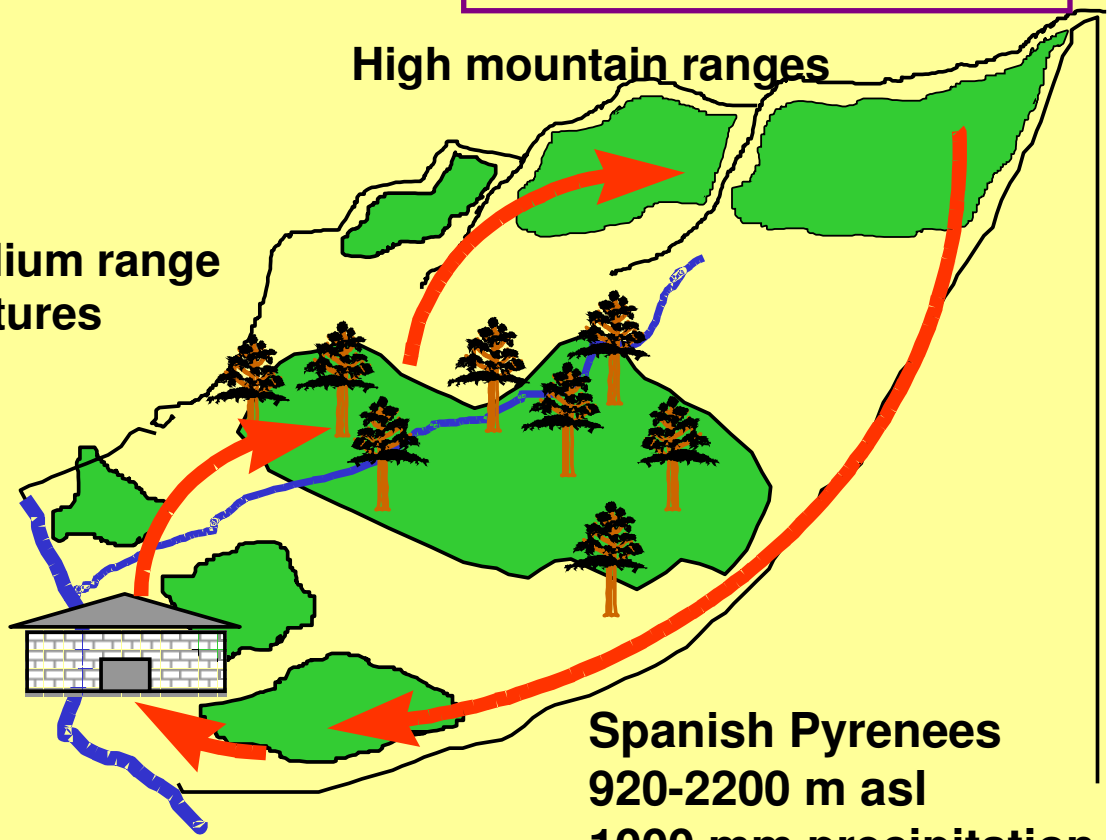
MATERIAL AND METHODS – Animals

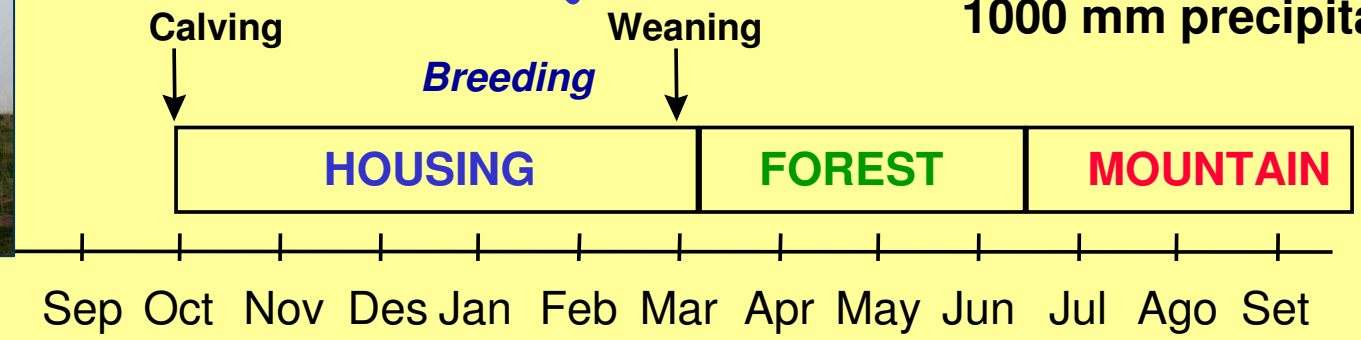
Autumn-calving cows

Multiparous
n=46, 5.7 yr
Primiparous
n=18, 3.0 yr



Last trimester of pregnancy





MATERIAL AND METHODS - Treatments

Calf management from the day after calving:

MULTIPAROUS
- **ONCE A DAY (1 x 30 min, 0800 h)**
- **TWICE A DAY (2 x 30 min, 0800 and 1600 h)**
- ***AD LIBITUM***

PRIMIPAROUS ***AD LIBITUM***

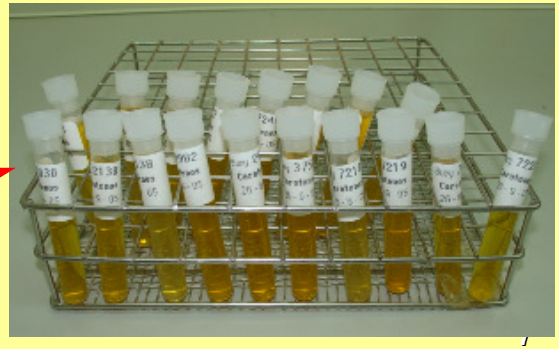
MATERIAL AND METHODS – Post-partum feeding

- Medium quality total dry mixed ration (TMR)
  - 9.6% CP, 52.3% NDF, 28.7% ADF

- 13 kg TMR → 100 MJ ME
  - 1 x maintenance in multiparous (560 kg, 9.0 kg ECM yield)
  - 0.4 kg/day target ADG in primiparous (500 kg, 9.0 kg ECM)

MATERIAL AND METHODS – Measurements and assays

- **Live-weight at calving-birth and once a week → ADG by regression during lactation.**
- **BCS of cows at calving and at the end of 3 months pp (Lowman et al., 1976).**
- **Milk yield and composition at weeks 2, 7 and 13 pp.**
- **Blood samples twice a week → progesterone as indicator of ovulation.**
- **Blood samples every 2 weeks → blood metabolites and IGF-I.**
- **Oestrus expression → Automated activity sensor.**



MATERIAL AND METHODS – Statistical analysis

- Data were analysed using the SAS statistical software.

- Cow-calf productive and reproductive performance → General linear model (GLM procedure) → separate analysis for suckling restriction (RESTR1 vs. RESTR2 vs. ADLIBC) or parity effects (ADLIBC vs. ADLIBH).

- Blood metabolites and endocrine IGF-I of the cows → Mixed linear model (MIXED procedure) by taking into account as well week of lactation effect.

- Multiple comparisons among treatments → Tukey's method (level of significance=0.05).
- Survival analysis (LIFETEST procedure) → effects of nursing frequency and parity on the interval from calving to first ovulation → Wilcoxon test

RESULTS AND DISCUSSION – Live-weight and body condition

	Cows			Heifers	*P*-value	
	RESTR1	RESTR2	ADLIBC	ADLIBH	Treat.	Parity
LW at calving, kg	562	556	558^{x}	495^{y}	NS	***
Cow ADG, kg/d	0.04^{a}	-0.11^{b}	-0.13^{b}	-0.01	*	NS
BCS at calving	2.57	2.57	2.57	2.49	NS	NS
BCS 3 months pp	2.68^{a}	2.56^{ab}	2.55^{b,x}	2.45^{y}	0.09	*
LW at birth	40.6	42.6	41.0^{x}	36.1^{y}	NS	**
Calf ADG, kg/d	0.67^{b}	0.92^{a}	0.84^{a}	0.86	**	NS

✓RESTR1 had greatest gains and BCS during lactation.

✓ADLIBC tended to maintain better body condition than ADLIBH, but calves grew similarly.

RESULTS AND DISCUSSION – Milk production and composition

	Cows			Heifers	*P*-value	
	RESTR1	RESTR2	ADLIBC	ADLIBH	Treat.	Parity
Milk yield, kg	7.4[b]	8.6[a]	9.1[a]	8.0	*	NS
Energy-corrected milk, kg	7.8	8.5	8.9	7.6	NS	NS
Milk fat, %	4.20[a]	3.58[b]	3.66[b]	3.54	**	NS
Milk protein, %	3.90	3.74	3.67	3.47	NS	NS
Milk lactose, %	4.71	4.87	4.66	4.47	NS	NS

✓ RESTR1 showed the lowest milk production and greatest milk fat content.

✓ Any milk production or composition difference between parities.

RESULTS AND DISCUSSION – Serum lipoproteins

Suckling restriction effect:

✓**Tryglicerides** and **cholesterol** did not differ (P>0.10).

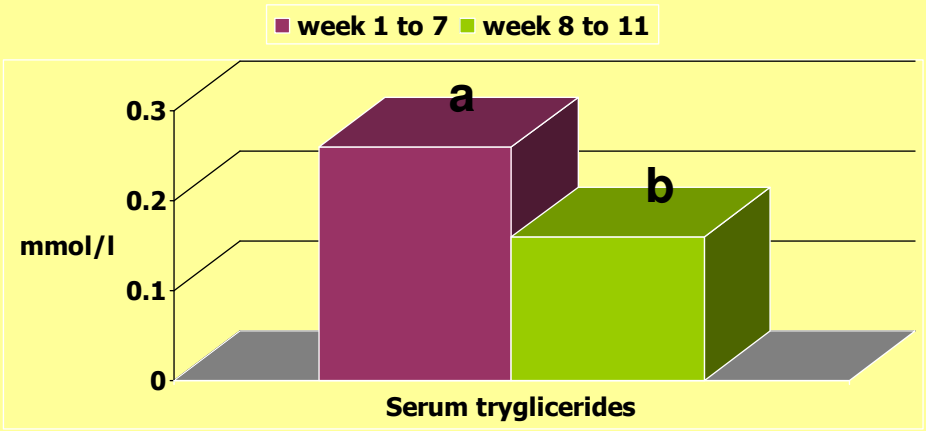
Parity effect:

✓**Tryglicerides** did not differ but **cholesterol** was lower in ADLIBC than in ADLIBH (**2.56** vs. **3.08** mmol/l, P<0.05).

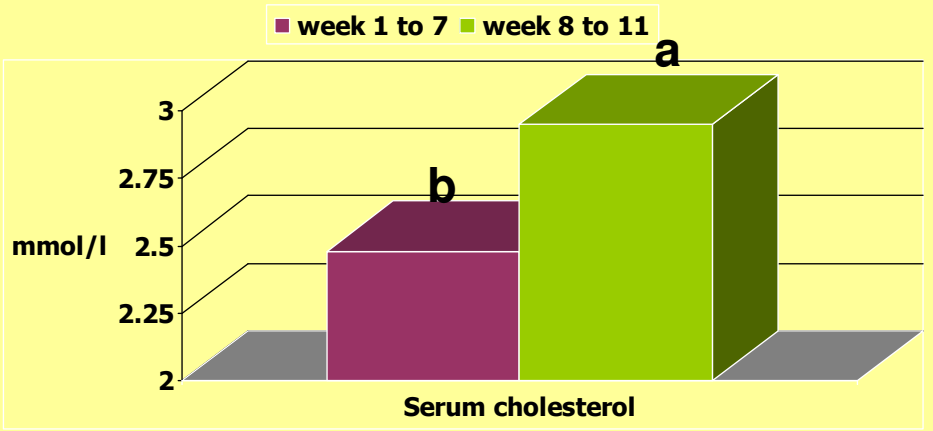
Week effect:

✓**Tryglicerides** were greater from week 1 through week 7 than afterwards.

✓**Cholesterol** increased from week 7 of lactation onwards.



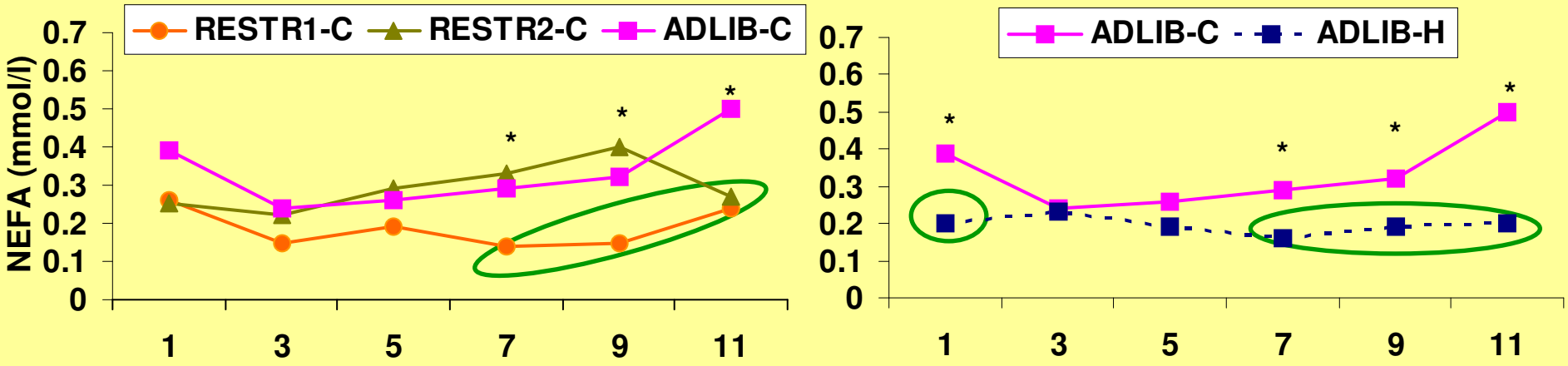
a,b **P<0.05**



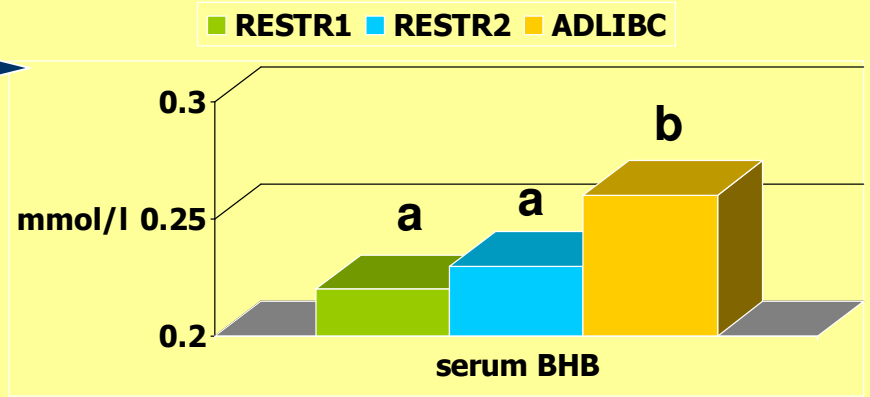
a,b **P<0.05**

RESULTS AND DISCUSSION – Serum NEFA, BHB and urea

- Suckling restriction x Week pp and Parity x Week pp interactions: **NEFA**



- Suckling restriction effect: **BHB**

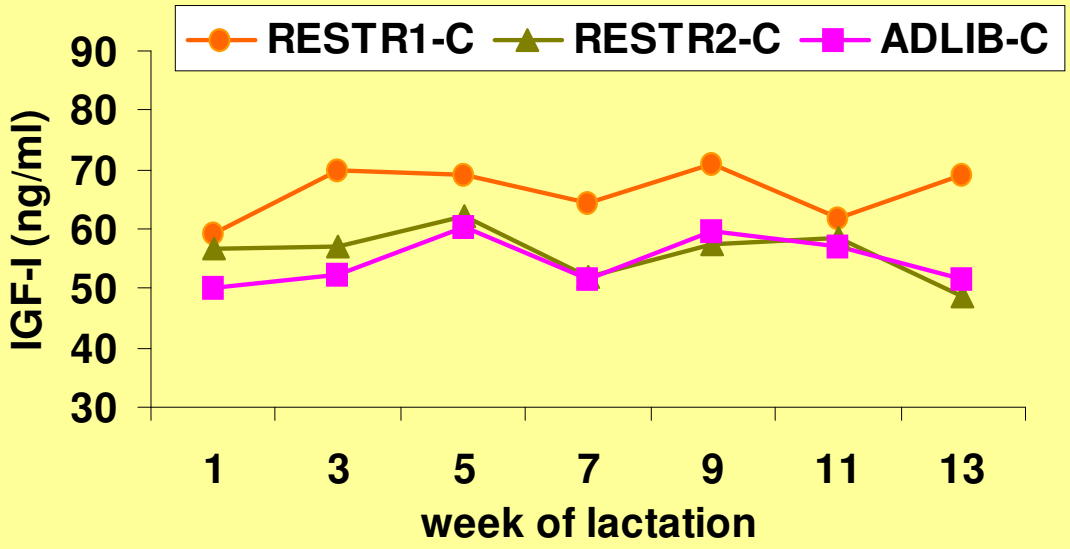


- Parity: **No effect in these metabolites.**

- Week effect: **Urea → greater at weeks 5-7 than in the rest of lactation**

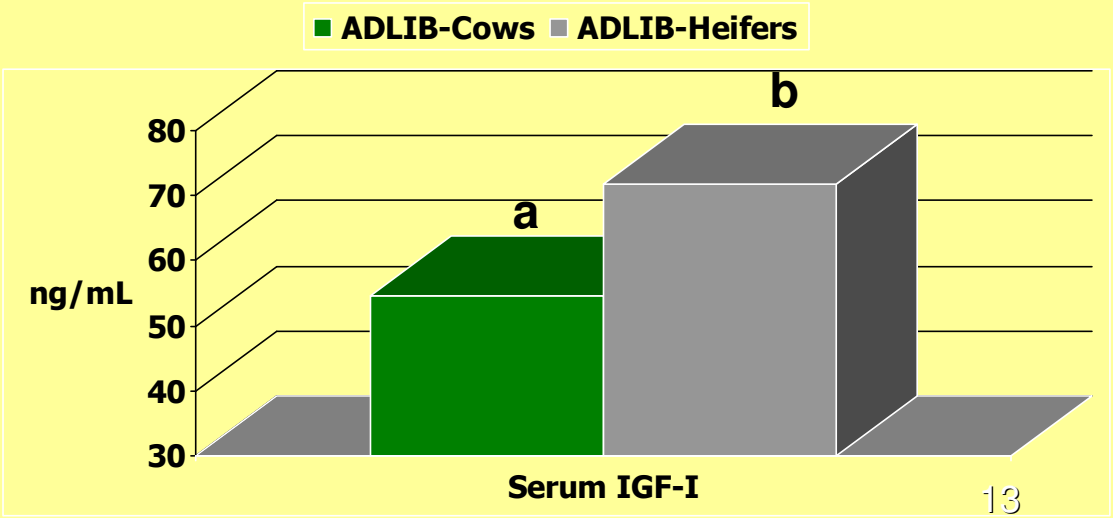
(5.07 vs. 4.46 mmol/l, P<0.05)

RESULTS AND DISCUSSION – Serum IGF-I



- **Suckling restriction:** No effect
- **Week post-partum:** No effect

- **Parity:** lower IGF-I in ADLIBC than in ADLIBH

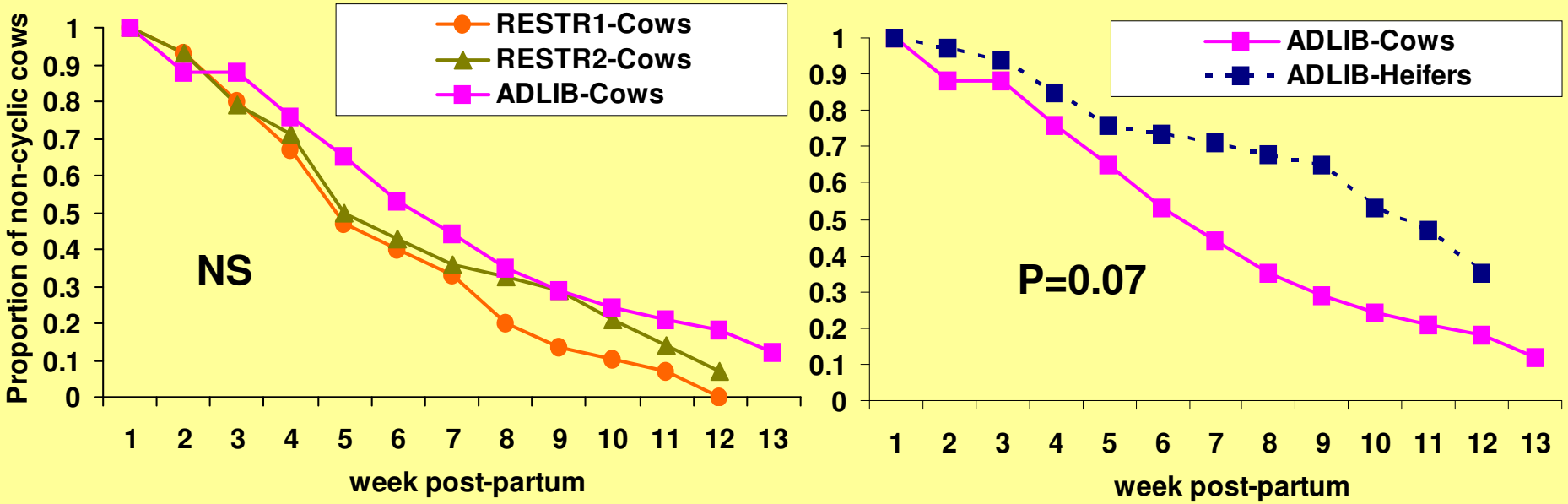


RESULTS AND DISCUSSION – Reproductive performance (1/2)

	Cows			Heifers	*P*-value	
	RESTR1	RESTR2	ADLIBC	ADLIBH	Treat.	Parity
Interval to 1st pp ovulation, d	46	52	58^{y}	79^{x}	NS	*
1st oestrus cycle duration, d	14	14	14	10	NS	0.10
Interval to 1st pp ovul. (cows with first oestrus detected), d	35	40	49^{y}	74^{x}	NS	0.07
Interval to 1st pp oestrus, d	45	44	56	73	NS	NS

✓ **Parity but not suckling restriction effect on pp anoestrus.**

RESULTS AND DISCUSSION – Reproductive performance (2/2)



✓**Suckling restriction** did not affect the ovarian resumption pattern.

✓**Parity** tended to affect the proportion of cows cycling over lactation.

CONCLUSIONS

- ✓ **The different productive and metabolic function due to suckling restriction did not trigger remarkable differences in the reproductive parameters of autumn-calving Parda de Montaña cows.**
- ✓ **Adult cows had different metabolic traits compared to heifers. Primiparous cows nursing *ad libitum* had a delay in the onset of ovarian cyclicity compared to their multiparous counterparts.**

IMPLICATIONS

- ✓ **If post-partum diet is not limiting, the reproductive parameters possibly mirror the pre-partum gains throughout the previous grazing season rather than reflect the influence of type of calf management.**


Thank you for attention!