



"Enseñar la Explotación de la  
Tierra No la del Hombre"

**European Regional Conference on Goats**

**Debrecen - Hungary  
Oradea - Romania  
2014**



# **BREED AND ENVIRONMENTAL FACTORS OF VARIATION UPON GROWTH TRAITS & LITTER SIZE IN FIVE GOAT GEOTYPES**

**C.A. Meza-Herrera<sup>a,\*</sup>, J.M. Serradilla<sup>b</sup>, M.E. Muñoz-Mejías<sup>b</sup>,  
F. Baena-Manzano<sup>b</sup>, A. Menendez-Buxadera<sup>b</sup>**

**<sup>a</sup> UNIVERSIDAD AUTONOMA CHAPINGO**  
**Regional University Unit on Dry Lands**  
*Bermejillo, Durango, Mexico.*

**<sup>b</sup> UNIVERSIDAD DE CÓRDOBA**  
**Animal Production Department**  
*Cordoba, Spain.*



## COMARCA LAGUNERA

Goat Population in Mexico:	10,000,000
Milk Production in Mexico (Lt):	150,000,000
Goat Population - CL:	445,000
Goat Producers - CL:	8,000
Milk Production - CL (Lt):	80,000,000
Goat Production Value - CL(USD):	55,000,000
Marginal Biosystems:	< 220 mm, > 45° C

# GOAT INVENTORY AND MILK PRODUCTION IN THE COMARCA LAGUNERA

[1980 – 2010]

<i>Item</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>2010</i>	<i>% change</i>
<i>Goats, number</i>	532,515	593,544	458,271	444,831	< 16 %
<i>Goats , production</i>	255,000	219,000	194,597	140,148	< 45%
<i>Milk, million lts.</i>	28.7	23.7	52.9	80.0	> 278%
<i>Liters / goat</i>	112.8	107.8	272.0	570.8	> 500%











# MATERIAL & METHODS



## *LOCATION, ENVIRONMENTAL CONDITIONS AND ANIMALS*

- **National Goat Center, Tlahualilo, Durango, Mexico.**
- **26° N, 103° W and 1,092 m.**
- **Mean annual T is 21°C, the hottest temperatures from May to July (> 45 C.).**
- **Mean annual rainfall is 186 mm, with 74% falling between June and October.**
- **Climate is classified as warm and extremely dry.**
- **Foundation herd was conformed by Non-defined breed goats x imported sires.**
- **Imported sires considered: Granadina, Nubian, Alpine, Saanen, & Toggenburg .**

# MATERIAL & METHODS

## *FEEDING & MANAGEMENT*

- Green alfalfa, alfalfa hay, sorghum silage, sorghum grain & a concentrate mixture -14% CP
- Pre-weaning period, all kids had access to alfalfa hay and concentrate..
- Kids BW's were registered within 24 h of birth, one month after and were weaned at 90 d of age.

## ▪ *DATA BASE MANAGEMENT & STATISTICAL ANALYSES*

- Data considered 52,805 production records.
- Data included information for BW (n=17,857), MW (n=14,409), WW (n=2,629) and LS (17,910) from the N, G, S, T, and A breeds.
- Data were classified according to breed (BR), gender (GK), litter size (LS), age of dam at kidding (AD), year of birth (YB), and season of birth (SB).
- Data editing, descriptive statistics, inferential statistical analyses for fixed effects were performed by using the procedures of the SAS.

# RESULTS & DISCUSSION



UACH-URUZA



**Table 1. Least-square means  $\pm$  s.e. for birth weight (BW, kg), monthly weight (MW, kg), weaning weight (WW, kg, 90 d) and litter size (LS, units) according to breed, gender and litter size in goats from northern Mexico (n=52,805, 26° N)**

<b>EFFECTS</b>	<b>BW (kg)</b> <b>(17,857)</b>	<b>MW (kg)</b> <b>(14,409)</b>	<b>WW (kg)</b> <b>(2,629)</b>	<b>LS (units)</b> <b>(17,910)</b>
<b>BREED</b>	***	***	***	***
-Nubian	2.88 $\pm$ 0.01 <sub>c</sub>	7.22 $\pm$ 0.05 <sub>c</sub>	13.27 $\pm$ 0.37 <sub>b</sub>	1.77 $\pm$ 0.01 <sub>a</sub>
-Granadina	2.43 $\pm$ 0.01 <sub>d</sub>	7.23 $\pm$ 0.05 <sub>d</sub>	13.15 $\pm$ 0.38 <sub>b</sub>	1.70 $\pm$ 0.01 <sub>b</sub>
-Saanen	3.05 $\pm$ 0.01 <sub>a</sub>	7.39 $\pm$ 0.05 <sub>a</sub>	13.51 $\pm$ 0.39 <sub>a</sub>	1.57 $\pm$ 0.01 <sub>d</sub>
-Toggenburg	2.99 $\pm$ 0.01 <sub>b</sub>	7.30 $\pm$ 0.06 <sub>b</sub>	13.09 $\pm$ 0.40 <sub>c</sub>	1.66 $\pm$ 0.01 <sub>c</sub>
-Alpine	3.07 $\pm$ 0.01 <sub>a</sub>	7.36 $\pm$ 0.05 <sub>a</sub>	13.46 $\pm$ 0.37 <sub>a,b</sub>	1.58 $\pm$ 0.01 <sub>d</sub>
<b>GENDER</b>	***	***	***	
-Male	3.00 $\pm$ 0.01 <sub>a</sub>	7.40 $\pm$ 0.05 <sub>a</sub>	13.76 $\pm$ 0.37 <sub>a</sub>	- - -
-Female	2.77 $\pm$ 0.01 <sub>b</sub>	7.22 $\pm$ 0.04 <sub>b</sub>	12.83 $\pm$ 0.36 <sub>b</sub>	- - -
<b>LITTER SIZE</b>	***	***	***	
- Simple	3.19 $\pm$ 0.01 <sub>a</sub>	7.58 $\pm$ 0.04 <sub>a</sub>	13.34 $\pm$ 0.36 <sub>a</sub>	- - -
- Double	2.86 $\pm$ 0.00 <sub>b</sub>	7.16 $\pm$ 0.04 <sub>b</sub>	13.13 $\pm$ 0.36 <sub>b</sub>	- - -
- Triplet	2.61 $\pm$ 0.01 <sub>c</sub>	7.19 $\pm$ 0.06 <sub>b</sub>	13.41 $\pm$ 0.43 <sub>a</sub>	- - -

**Table 2. Least-square means  $\pm$  s.e. for birth weight (BW, kg), monthly weight (MW, kg), weaning weight (WW, kg, 90 d) and litter size (LS, units) according to year & season of birth and age of dam in goats from northern Mexico (n=52,805, 26° N)**

<b>EFFECTS</b>	<b>BW (kg)</b> (17,857)	<b>MW (kg)</b> (14,409)	<b>WW (kg)</b> (2,629)	<b>LS (units)</b> (17,910)
<b>YEAR OF BIRTH</b>	***	***	***	***
<b>SEASON OF BIRTH</b>	***	***	***	***
- Spring	2.90 $\pm$ 0.00b	7.33 $\pm$ 0.04b	12.78 $\pm$ 0.36b	1.65 $\pm$ 0.00b
- Summer	2.81 $\pm$ 0.02c	7.19 $\pm$ 0.09c	14.24 $\pm$ 0.46a	1.61 $\pm$ 0.02c
- Fall	2.93 $\pm$ 0.01a	7.56 $\pm$ 0.05a	13.13 $\pm$ 0.41b	1.69 $\pm$ 0.01a
- Winter	2.91 $\pm$ 0.00b	7.16 $\pm$ 0.04c	13.04 $\pm$ 0.36b	1.67 $\pm$ 0.00a
<b>AGE OF DAM</b>	***	***	***	***
1	2.61 $\pm$ 0.01e	7.27 $\pm$ 0.06a	13.51 $\pm$ 0.40a	1.28 $\pm$ 0.01e
2	2.77 $\pm$ 0.01d	7.36 $\pm$ 0.05a	13.52 $\pm$ 0.37a	1.50 $\pm$ 0.01d
3	2.94 $\pm$ 0.01b	7.40 $\pm$ 0.05a	13.53 $\pm$ 0.36a	1.63 $\pm$ 0.01c
4	2.99 $\pm$ 0.01a,b	7.39 $\pm$ 0.05a	13.51 $\pm$ 0.37a	1.72 $\pm$ 0.01a
5	3.01 $\pm$ 0.01a	7.37 $\pm$ 0.05a	13.48 $\pm$ 0.37a	1.75 $\pm$ 0.01a
6	3.02 $\pm$ 0.01a	7.30 $\pm$ 0.05a	13.57 $\pm$ 0.37a	1.78 $\pm$ 0.01a
7	2.99 $\pm$ 0.01b	7.32 $\pm$ 0.06a	12.99 $\pm$ 0.41a	1.76 $\pm$ 0.01a
8	2.91 $\pm$ 0.01c	7.37 $\pm$ 0.06a	13.13 $\pm$ 0.49a	1.72 $\pm$ 0.02a
9	2.87 $\pm$ 0.02c,d	7.11 $\pm$ 0.07b	12.68 $\pm$ 0.52a	1.75 $\pm$ 0.02a
10	2.74 $\pm$ 0.02e	7.25 $\pm$ 0.10b	12.62 $\pm$ 0.69a	1.66 $\pm$ 0.02b



# CONCLUSIONS

**Results of our study confirm that breed and other environmental factors affect in a significant fashion the expression of weight traits at birth, one month of age and at weaning.**

**Such genotype and non-genetic effects also extends their influence upon the phenotypic expression of litter size and seasonal breeding.**

**As previously mentioned, genetic change depends not only on genetic estimations but also on the observed phenotypic variation,**

**Therefore, estimation and improvement of non-genetic-environmental factors, must be considered when building statistical models designed for estimation of genetic parameters and genetic evaluation of goats.**

**The last being of primordial importance to the goat industry.**

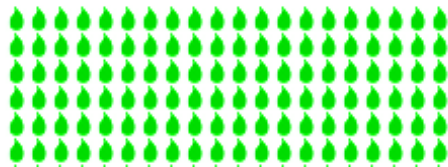
# WATER FOOTPRINT IN DIFERENT COMMODITIES



**Beef**

**Global Average Water Footprint**  
15415 litre/kg

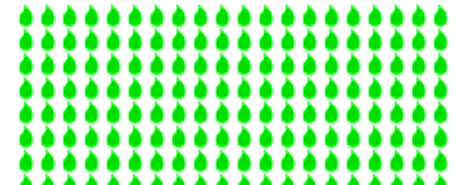
94% green, 4% blue, 3% grey



**Sheep Meat**

**Global Average Water Footprint**  
10412 litre/kg

94% green, 5% blue, 1% grey



**Goat Meat**

**Global Average Water Footprint**  
5521 litre/kg

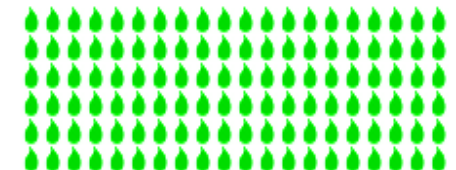
94% green, 6% blue, 0% grey



**Chicken Meat**

**Global Average Water Footprint**  
4325 litre/kg

82% green, 7% blue, 11% grey







**UNIVERSIDAD AUTÓNOMA CHAPINGO**  
**UNIDAD REGIONAL UNIVERSITARIA DE ZONAS ÁRIDAS**  
**COORDINACIÓN DE POSGRADO**  
**MÉXICO**



"Enseñar la Explotación de la  
Tierra No la del Hombre"

**Thanks,**

**Köszönöm,**

**Mulțumesc,**

**Merci ...**

**Ph.D. César A. Meza-Herrera**

[cmeza2020@hotmail.com](mailto:cmeza2020@hotmail.com)

[cmeza2000@gmail.com](mailto:cmeza2000@gmail.com)

[www.researchgate.org/meza-herrera](http://www.researchgate.org/meza-herrera)

**ERCG-2014, HUNGARY & ROMANIA**

**April, 2014**