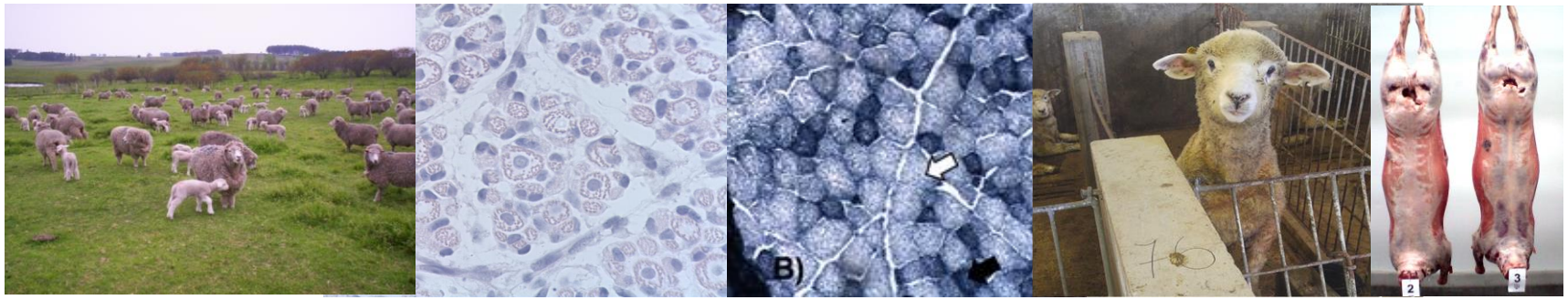
Seminario de Carne Ovina 2022:

Desafíos para el desarrollo de la cadena en Uruguay.

Programación Fetal por Subnutrición: Impacto sobre el desarrollo muscular y la producción de carne en ovinos

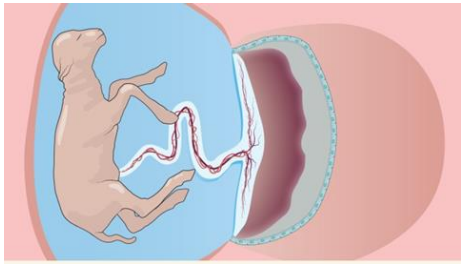


Javier Ithurralde Lemes
DCV. MSc. PhD.
Departamento de Producción Animal y Pasturas
Facultad de Agronomía
Universidad de la República

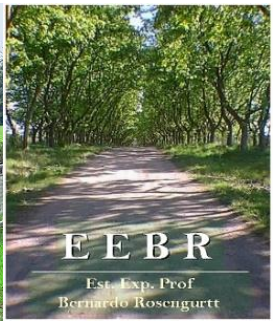
ORGANIZAN: inac Instituto Nacional de Carnes · INIA Instituto Nacional de Investigación Agropecuaria URUGUAY · SECRETARIADO URUGUAYO DE LA LANA

Esquema de la presentación:

- **Introducción general (Programación fetal por subnutrición, producción animal y producción de carne).**

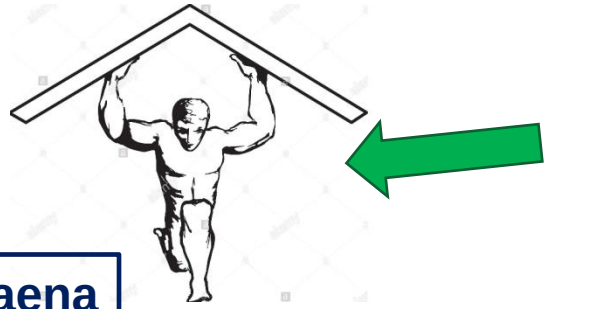


- **Resultados recientes de Investigación nacional vinculada a programación fetal, desarrollo muscular y producción de carne**

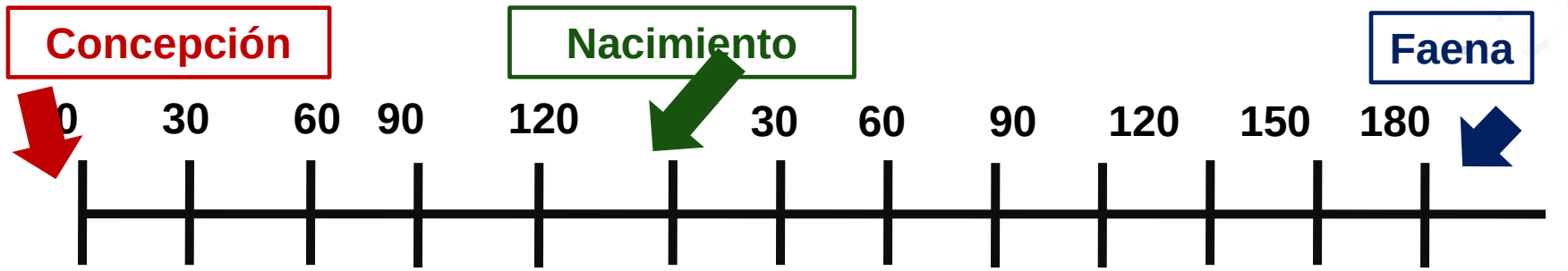


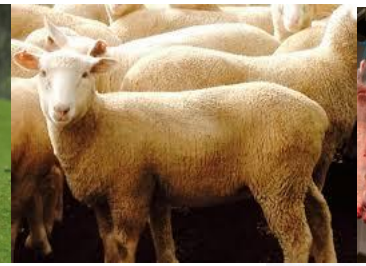
- **Conclusiones y consideraciones finales**

Programación fetal y producción de carne

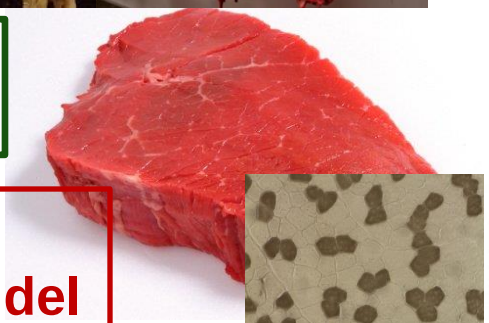


“PROGRAMACION FETAL” Consecuencias permanentes generadas por efectos ambientales durante etapas claves del desarrollo fetal (Rhind et al., 2001).



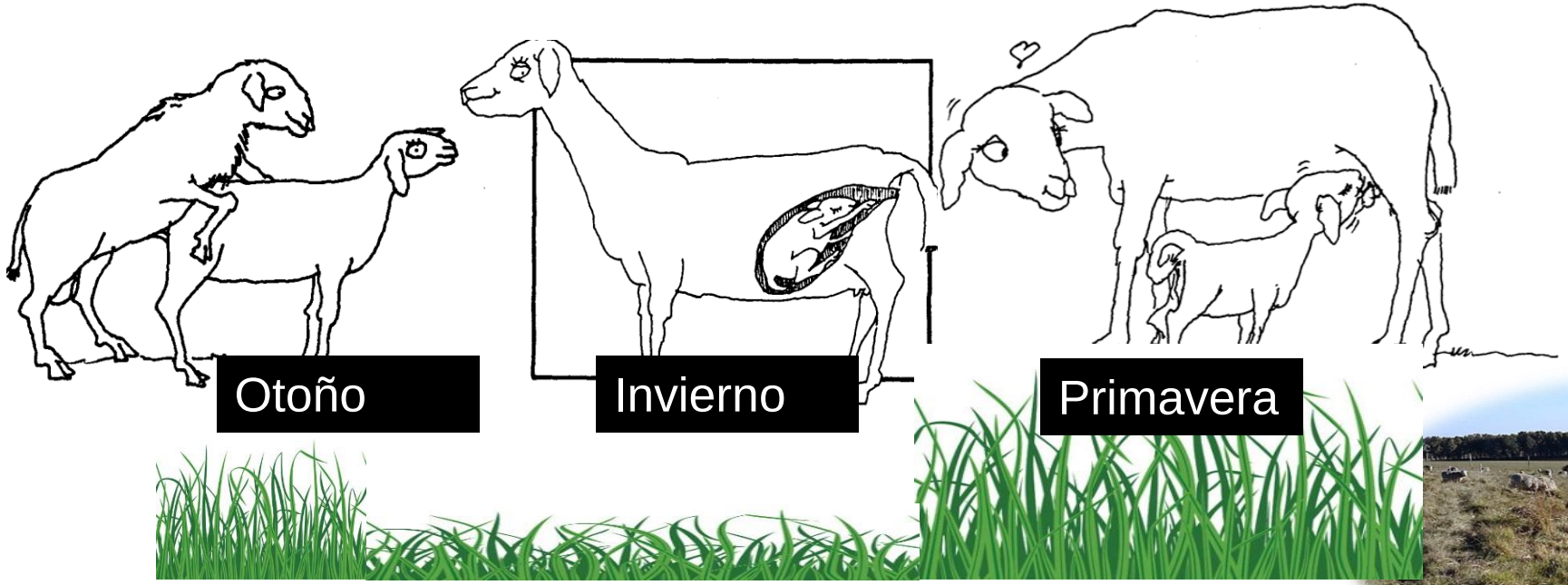


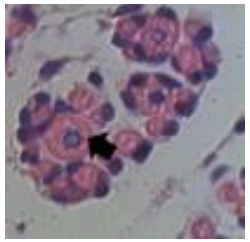
Más del 40 % de la “vida” desde la concepción hasta el final del ciclo productivo transcurre “in utero”.



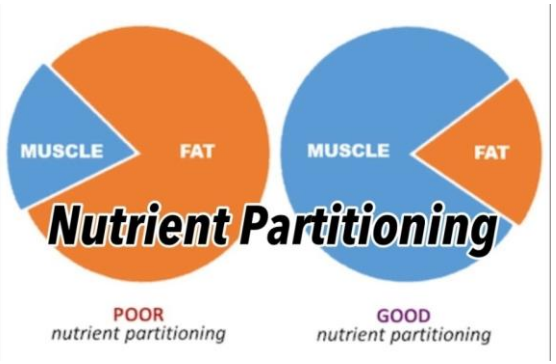
La etapa intrauterina prenatal es especialmente relevante para el desarrollo del principal componente de la carne.

Subnutrición gestacional en sistemas de cría extensivos





MIOGÉNESIS



Período crítico para la formación de fibras musculares

Animal, page 1 of 9 © The Animal Consortium 2017
doi:10.1017/S1751731117001550

animal

Growth, meat and feed efficiency traits of lambs born to ewes submitted to energy restriction during mid-gestation

L. Piaggio[1], G. Quintans[2], R. San Julián[2], G. Ferreira[1], J. Ithurralde[3], S. Fierro[1], A. S. C. Pereira[4], F. Baldi[5] and G. E. Banchero[2†]

Small Ruminant Research 180 (2019) 57–62

Contents lists available at ScienceDirect

Small Ruminant Research

journal homepage: www.elsevier.com/locate/smallrumres

Refeeding ewe's *ad libitum* after energy restriction during mid-pregnancy does not affect lamb feed conversion ratio, animal performance and meat quality

Santiago Luzardo[a,*], Guillermo de Souza[a], Graciela Quintans[b], Georgget Banchero[c]

Faculdade de Medicina Veterinária e Zootecnia, USP.
Faculdade de Ciências Agrárias e Veterinárias, UNESP.

Subnutrición gestacional energética controlada (asignaciones en función de requerimientos de EM) en períodos acotados y con diferencias en niveles de realimentación pos restricción.

Ovejas Polwarth multíparas
Carneros Texel

Exp. 1

Animal, page 1 of 9 © The Animal Consortium 2017
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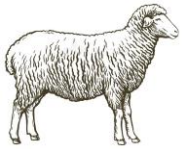
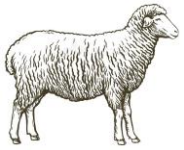


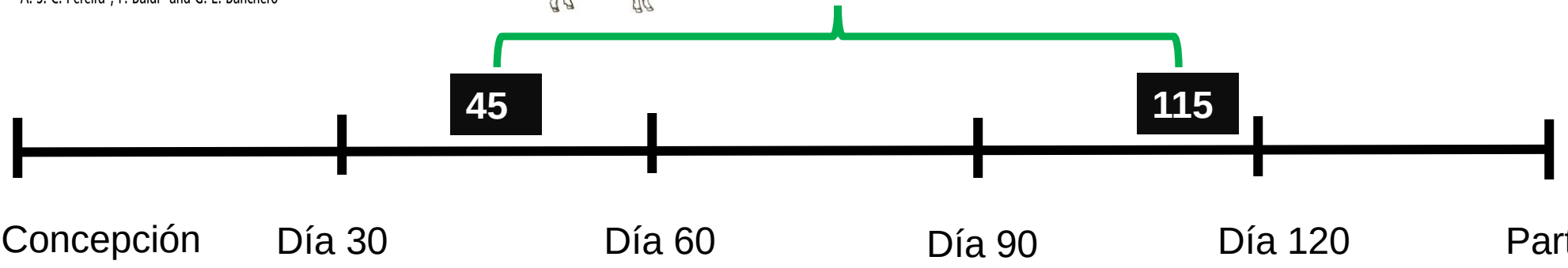
100% EM



70% EM

Avena *ad libitum*

Avena *ad libitum*



Ovejas Polwarth multíparas
Carneros Texel

Exp. 2

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animal

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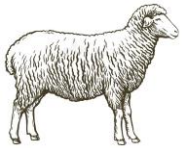
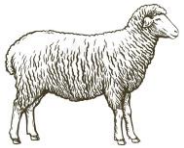


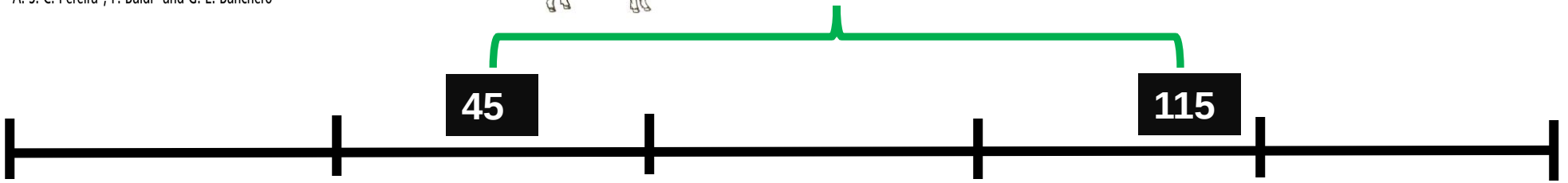
100% EM



60% EM

Realimentación controlada 6 kgMS/100 kg PV de Avena

Pasturas mejoradas ad libitum



Ovejas Polwarth multíparas
Carneros Finnish

Small Ruminant Research 180 (2019) 57–62

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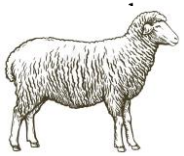
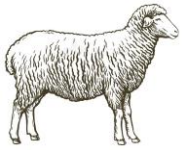


100% EM



60% EM

Avena *ad libitum*

Grano de cebada
0,2 kg MS /oveja

Pasturas mejoradas

48

106

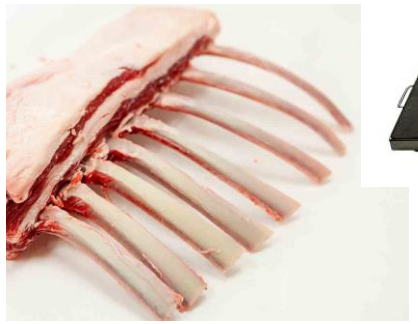
Concepción | Día 30 | Día 60 | Día 90 | Día 120 | Parto

Experimento 1:
Restricción 70% EM día 45 al 110

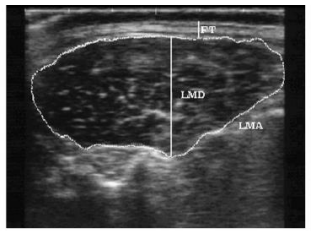
Ad libitum

Item	Treatment R	Treatment NR
SW (kg)	32.0 ± 0.67	33.0 ± 0.69
FD (mm)	10.95 ± 0.37	11.72 ± 0.39
CW (kg)	16.65 ± 0.09	16.75 ± 0.11
CYd (%)	51.9 ± 0.31	52.3 ± 0.33
CL (cm)	64.43 ± 0.30	64.91 ± 0.32
LL (cm)	34.82 ± 0.20	34.74 ± 0.21
FRW (g)	718 ± 9.31	746 ± 9.83
LW (g)	3873 ± 39.1	3775 ± 41.3
FRYd (%)	2.25 ± 0.03	2.33 ± 0.03
LYd (%)	12.19 ± 0.14	11.85 ± 0.15
*L**	38.0 ± 0.30	38.3 ± 0.30
*a**	16.8 ± 0.22	17.2 ± 0.22
*b**	6.87 ± 0.27	7.37 ± 0.27
SF (kgf)	4.43 ± 0.35	3.63 ± 0.35

Restringidos nacen más pesados y luego no hay diferencias en pesos ni ganancias



French rack mas liviano y de menor rinde



Item	Treatment R	Treatment NR
BW (kg)	4.55 ± 0.09	4.22 ± 0.09
WW (kg)	25.1 ± 0.60	26.4 ± 0.63
FW (kg)	37.5 ± 0.77	38.4 ± 0.80
preWG (kg)	0.207 ± 0.005	0.201 ± 0.005
postWG (kg)	0.188 ± 0.007	0.199 ± 0.006

Item	Treatment R	Treatment NR
REAi (cm^2)	7.93 ± 0.22	8.41 ± 0.23
REAf (cm^2)	11.12 ± 0.26	11.64 ± 0.27
BFi (mm)	2.38 ± 0.09	2.65 ± 0.10
BFf (mm)	2.75 ± 0.11	2.86 ± 0.11

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Experimento 2:
Restricción 60% EM día 45 al 110

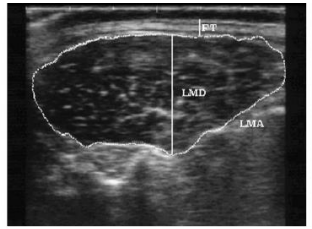
100 % REM

Item	R	NR
BW (kg)	4.26 ± 0.09	4.36 ± 0.09
WW (kg)	23.21 ± 0.54	25.3 ± 0.54
FW (kg)	34.7 ± 0.65	37.2 ± 0.65
preWG (kg)	0.164 ± 0.002	0.183 ± 0.002
postWG (kg)	0.231 ± 0.005	0.242 ± 0.005
FI (kg)	59.7 ± 1.92	54.9 ± 1.82
FI (% LW)[1]	3.82 ± 0.13	3.21 ± 0.13
G:F[2] (kg/kg)	0.158 ± 0.01	0.182 ± 0.01

Sin diferencias de PNAC; luego restringidos ganan menos hasta el destete, pesan menos al destete y a la faena, y consumen más.

Item	R	NR
SW (kg)	31.4 ± 0.58	33.9 ± 0.57
FD (mm)	10.45 ± 0.38	10.73 ± 0.37
CW (kg)	61.0 ± 0.27	61.3 ± 0.26
CYd (%)	37.0 ± 0.21	37.1 ± 0.21
CL (cm)	16.1 ± 0.10	16.0 ± 0.10
LL (cm)	803 ± 7.69	799 ± 7.52
FRW (g)	3143 ± 27	3139 ± 26
LW (g)	49.0 ± 0.29	48.6 ± 0.28
FRYd (%)	2.45 ± 0.002	2.43 ± 0.002
LYd (%)	9.58 ± 0.008	9.56 ± 0.008
*L**	41.99 ± 0.63	41.84 ± 0.61
*a**	17.71 ± 0.24	17.26 ± 0.23
*b**	6.40 ± 0.28	5.99 ± 0.27
SF (kgf)	4.42 ± 0.32	4.02 ± 0.31

Solo diferencias en peso a la faena



Item	R	NR
REAi (cm^2)	7.69 ± 0.16	7.50 ± 0.15
REAf (cm^2)	11.17 ± 0.19	11.25 ± 0.19
BFi (mm)	1.62 ± 0.04	1.67 ± 0.04
BFf (mm)	2.73 ± 0.08	2.76 ± 0.08

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Restricción 60% EM día 48 al 106 → *Ad libitum*

	Trt[1]	
	R (n = 32)	NR (n = 32)
BW (kg)	4.15 ± 0.11	4.30 ± 0.10
WW (kg)	23.09 ± 0.35	23.54 ± 0.33
preWG (g/d)	201.7 ± 5.72	207.0 ± 5.22
MP/d (kg)	1.337 ± 0.085	1.413 ± 0.089
TSP/d (kg)	0.238 ± 0.014	0.253 ± 0.015
FCR[4] milk (kg/kg)	4.906 ± 0.306	4.959 ± 0.322

No hay efectos

	Trt[1]	
	R (n = 24)	NR (n = 31)
SW (kg)	37.5 ± 0.7	37.3 ± 0.6
HCW[3] (kg)	19.3 ± 0.1	19.5 ± 0.1
CYd[4] (%)	51.8 ± 0.4	52.0 ± 0.3
GR[4] (mm)	15.1 ± 0.7	15.0 ± 0.6
CL[4] (cm)	64.5 ± 0.5	64.1 ± 0.4
LL[4] (cm)	36.6 ± 0.2	36.6 ± 0.2
FRW[4] (g)	439[b] ± 5.1	459[a] ± 4.5
LW[4] (g)	1842 ± 15.9	1842 ± 13.8
FRYd[45] (%)	2.26[b] ± 0.03	2.37[a] ± 0.02
LYd[45] (%)	9.53 ± 0.08	9.53 ± 0.07
WBSF 5 d (kg)	3.09 ± 0.22	3.29 ± 0.19
Meat color		
L* - 5 d	41.8[a] ± 0.4	40.7[b] ± 0.3
a* - 5 d	20.2 ± 0.3	19.8 ± 0.3
b* - 5 d	5.7 ± 0.2	5.9 ± 0.3

	Trt[1]	
	R (n = 24)	NR (n = 31)
IW (kg)	30.2 ± 0.7	30.2 ± 0.6
FW (kg)	42.6 ± 0.9	42.6 ± 0.7
postWG (g/d)	214 ± 7.2	214 ± 6.3
RI (kg/d)	1.463 ± 0.030	1.428 ± 0.026
FCR[3] (kg/kg)	6.99 ± 0.21	6.81 ± 0.19

NR: French rack mas pesado y de mayor rinde
Carne menos luminosa

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Maternal undernutrition affects secondary myogenesis in a muscle-dependent way across the major muscles of 70-day old ovine fetuses

Javier Ithurralde[a,*], Patricia Genovese[b], María José Abud[a], Álvaro López-Pérez[a], Raquel Pérez-Clariget[a], Alejandro Bielli[b]

Contents lists available at ScienceDirect

Livestock Science

journal homepage: www.elsevier.com/locate/livsci

Sex-dependent effects of maternal undernutrition on growth performance, carcass characteristics and meat quality of lambs

Javier Ithurralde[a,*], Raquel Pérez-Clariget[a], Florencia Corrales[a], Danilo Fila[b], Álvaro López-Pérez[a], María de Jesús Marichal[a], Ali Saadoun[c], Alejandro Bielli[d]

Contents lists available at ScienceDirect

Meat Science

journal homepage: www.elsevier.com/locate/meatsci

Gestational nutrient restriction under extensive grazing conditions: Effects on muscle characteristics and meat quality in heavy lambs

J. Ithurralde[a,*], R. Pérez-Clariget[a], A. Saadoun[a], P. Genovese[b], C. Cabrera[a], Y. López[c], O. Feed[c], A. Bielli[b]

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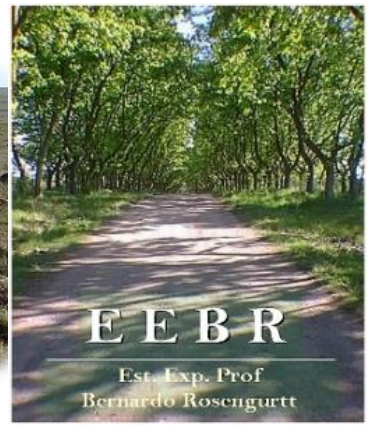
FVET Facultad de Veterinaria Universidad de la República Uruguay

Subnutrición inducida en pastoreo extensivo de CN.



EXP. 1

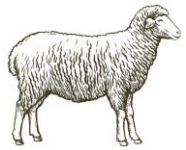
Ovejas Corriedale multíparas, carneros Corriedale

Extensión de los tratamientos nutricionales

Día -23 — Día 90 — Día 122

Marzo | **Abril** | **Mayo** | **Junio** | **Julio** | **Agosto** | **Setiembre**

-35 | -5 | 25 | 55 | 85 | 115 | 145



N=178

AOF

10%

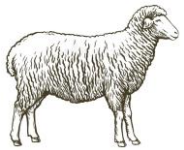
12%

Afrechillo arroz 200 g y Glicerina 50 ml

***Festuca arundinacea* (14%)**

Fetos 70 D

Corderos neonatos



N=157

BOF

5%

8%

EXP. 2

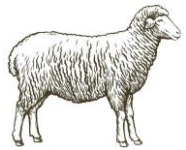
Ovejas Corriedale multíparas, carneros Corriedale

Extensión de los tratamientos nutricionales

Día 30 | Día 60 | Día 90 | Día 143

Abril | **Mayo** | **Junio** | **Julio** | **Agosto** | **Setiembre** | **Destete 90 D** | **Faena 200 D**

25 | 55 | 85 | 115 | 145

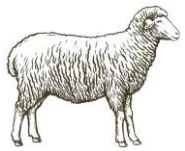


AOF

N=22

Afrechillo arroz 300 g

14% | **15%** | **20%**



BOF

N=19

6% | **5%** | **10%**

Campo natural NR

ENGORDE

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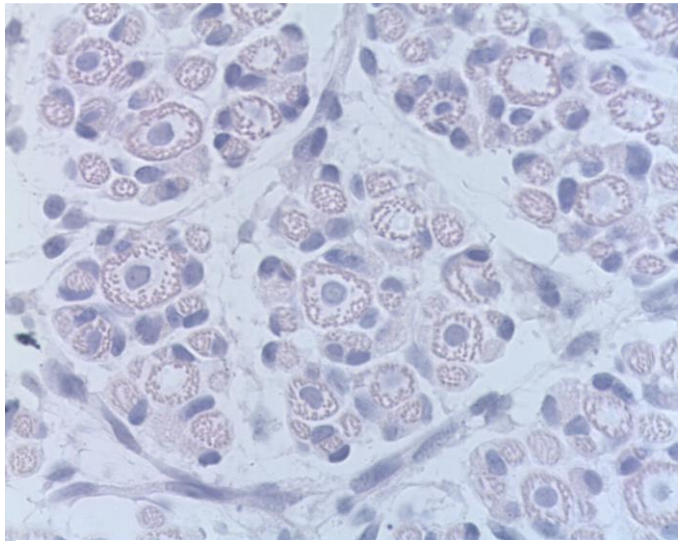
Javier Ithurralde[a,*], Patricia Genovese[b], María José Abud[a], Álvaro López-Pérez[a], Raquel Pérez-Clariget[a], Alejandro Bielli[b]

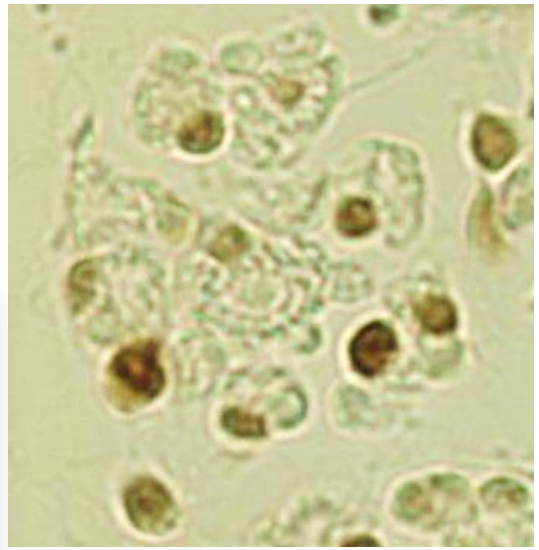


La miogénesis hiperplásica secundaria está reducida en músculos de BOF.

Muscle	Secondary to primary fiber ratio		*P* value
	HPA	LPA	
Psoas major	8.78 ± 0.44[a]	5.65 ± 0.43[b]	0.03
Longissimus lumborum	7.81 ± 0.39[a]	5.26 ± 0.39[b]	< 0.001
Gluteus medius	4.81 ± 0.43	4.44 ± 0.43	0.19
Gluteobiceps	7.92 ± 0.45[a]	4.44 ± 0.43[b]	0.03
Semimembranosus	8.41 ± 0.42[a]	4.74 ± 0.39[b]	0.024
Semitendinosus	7.77 ± 0.28[a]	4.27 ± 0.28[b]	< 0.001

La actividad mitótica y la expresión MRFs está afectada en músculos de BOF.

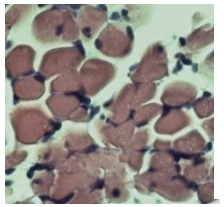
Muscle	*Myogenin* positive nuclei per fascicle		*P* value	*PCNA* positive nuclei per fascicle		*P* value
	HPA	LPA		HPA	LPA	
Psoas major	0.43 ± 0.16	0.76 ± 0.16	0.13	4.62 ± 0.22	3.85 ± 0.23	0.14
Longissimus lumborum	0.51 ± 0.07	0.61 ± 0.06	0.29	2.58 ± 0.19[a]	1.78 ± 0.18[b]	0.01
Gluteus medius	0.60 ± 0.06[a]	0.37 ± 0.06[b]	0.02	2.85 ± 0.27[x]	2.13 ± 0.25[y]	0.08
Gluteobiceps	0.28 ± 0.03	0.29 ± 0.03	0.78	1.61 ± 0.18[a]	0.50 ± 0.17[b]	< 0.001
Semimembranosus	0.35 ± 0.05	0.35 ± 0.04	0.99	2.66 ± 0.18	3.00 ± 0.17	0.27
Semitendinosus	0.33 ± 0.02	0.33 ± 0.02	0.94	3.62 ± 0.27	3.65 ± 0.26	0.92



LOS EFECTOS PUEDEN VARIAR EN FUNCIÓN DEL MÚSCULO

	Longissimus lumborum			*Semitendinosus*		
	HPA[1]	LPA[2]	P-value	HPA[1]	LPA[2]	P-value
Fiber Diameter (µ)	29.82 ± 0.97^{a}	20.85 ± 0.97^{b}	<0.0001	25.1 ± 0.8^{a}	21.3 ± 0.8^{b}	0.0058
Fiber density/ µm2 (x 10-4)	4.05 ± 0.2^{a}	3.12 ± 0.2^{b}	0.005	4.6 ± 0.35^{x}	3.7 ± 0.37^{y}	0.09
N° nuclei/Fiber	1.76 ± 0.07^{a}	1.26 ± 0.07^{b}	<0.0001	1.30 ± 0.02^{a}	1.09 ± 0.02^{b}	<0.0001
Muscle tissue (%)	42.27 ± 1.90^{a}	32.24 ± 1.90^{b}	0.002	53.3 ± 2.8^{a}	43.4 ± 2.8^{b}	0.025

Al nacer los corderos BOF presentan: menor densidad fibrilar, fibras de menor diámetro y con menos núcleos, y menos porcentaje de tejido muscular



	Longissimus lumborum			*Semitendinosus*		
	HPA[1]	LPA[2]	P-value	HPA[1]	LPA[2]	P-value
MYHC I	0.4528 ± 0.1541^{y}	0.7388 ± 0.1541^{x}	0.0529	0.4274 ± 0.1602	0.7609 ± 0.1498	0.1440
GLUT-4	0.4629 ± 0.2584^{y}	1.142 ± 0.2988^{x}	0.0647	0.2030 ± 0.05548	0.2964 ± 0.04995	0.2155
PAX7	0.5307 ± 0.4510^{y}	1.3813 ± 0.4219^{x}	0.0663	0.4104 ± 0.2975^{b}	1.0205 ± 0.2877^{a}	0.0319
MYOGEN	0.4761 ± 0.1492	0.7823 ± 0.1218	0.1359	0.5811 ± 0.2422	0.8451 ± 0.2357	0.2122
PPARG	0.7473 ± 0.1304	0.7874 ± 0.1304	0.8310	0.7359 ± 0.1237	0.4483 ± 0.1237	0.1286
IGF-1	2.4590 ± 0.5330^{a}	0.5828 ± 0.6093^{b}	0.0361	0.6725 ± 0.09454^{a}	0.3726 ± 0.1011^{b}	0.0494

Músculos de corderos BOF poseen mayores expresiones (mRNA) de MYHC-I, GLUT4 y PAX7, y menor expresión de IGF-1.

EL POTENCIAL HIPERTRÓFICO POSNATAL ESTÁ AFECTADO

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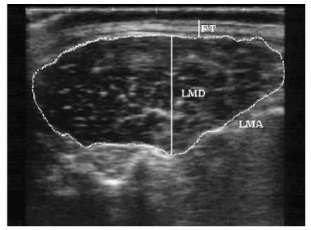


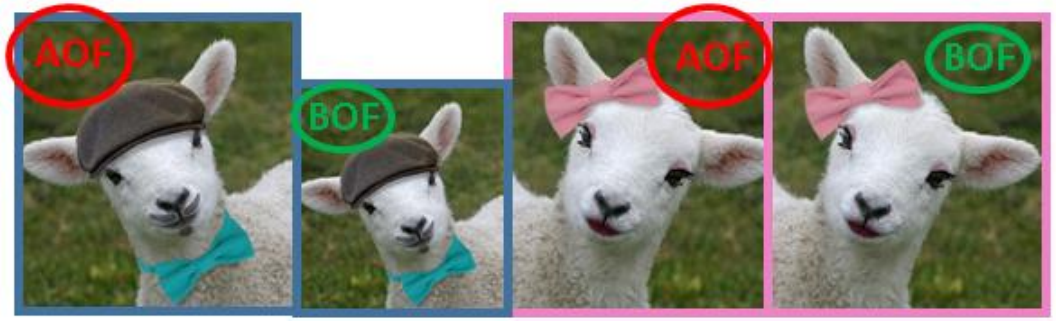
Sex-dependent effects of maternal undernutrition on growth performance, carcass characteristics and meat quality of lambs

Javier Ithurralde[a,*], Raquel Pérez-Clariget[a], Florencia Corrales[a], Danilo Fila[b], Álvaro López-Pérez[a], María de Jesús Marichal[a], Ali Saadoun[c], Alejandro Bielli[d]

	HPA		LPA	
	Females	Males	Females	Males
Birth	4.34 ± 0.91[a]	4.75 ± 0.91[A]	4.29 ± 0.83[a]	4.24 ± 0.95[A]
Day 45	13.63 ± 0.91[a]	14.28 ± 0.91[X]	13.72 ± 0.8[a]	12.26 ± 0.95[Y]
Weaning (Day 90)	17.75 ± 0.91[a]	20.27 ± 0.93[A]	17.97 ± 0.82[a]	15.95 ± 0.95[B]

	HPA			LPA		
	Pooled males and females	Males	Females	Pooled males and females	Males	Females
LD area (cm^2)	7.88 ± 0.45[a]	8.54 ± 0.53[a]	7.22 ± 0.53	7.01 ± 0.45[b]	6.89 ± 0.55[b]	7.12 ± 0.51
LD perimeter (cm)	6.12 ± 0.23[x]	6.56 ± 0.29[a]	5.69 ± 0.29	5.69 ± 0.23[y]	5.66 ± 0.30[b]	5.71 ± 0.27
MBW (Kg)	30.94 ± 1.00	33.31 ± 1.35[a]	28.56 ± 1.36	28.94 ± 0.99	28.36 ± 1.44[b]	29.32 ± 1.22
MDG (Kg)	0.254 ± 0.01[a]	0.283 ± 0.02	0.224 ± 0.02	0.227 ± 0.01.[b]	0.240 ± 0.02	0.214 ± 0.01
MDGM (%)	1.98 ± 0.08	2.09 ± 0.11	1.88 ± 0.11	1.89 ± 0.08	2.03 ± 0.08	1.74 ± 0.10
MDFI (g)	1283.1 ± 38.9	1362.1 ± 49.4[a]	1204.2 ± 49.7	1215.9 ± 38.7	1180.2 ± 51.7[b]	1251.6 ± 45.4
MFIMW (%)	10.22 ± 0.19	10.26 ± 0.24	10.17 ± 0.25	10.20 ± 0.19	10.11 ± 0.26	10.30 ± 0.22
FCR (Kg)	6.31 ± 0.49	6.49 ± 0.68	6.13 ± 0.69	6.47 ± 0.48	6.07 ± 0.73	6.87 ± 0.62

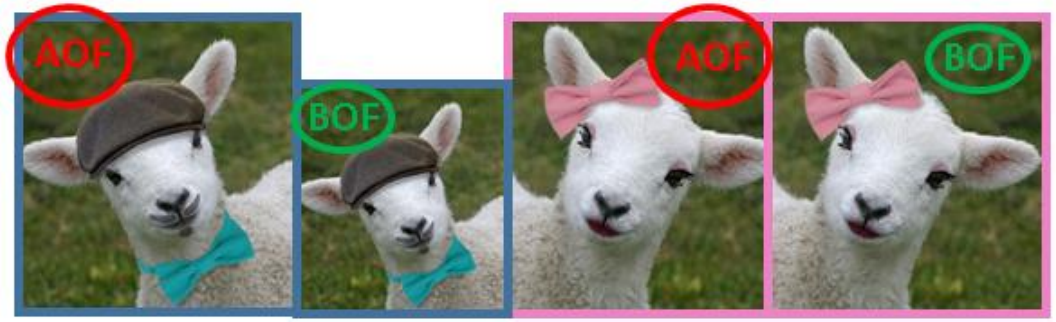
La menor oferta de forraje gestacional afectó el crecimiento de la progenie de un modo sexo-dependiente



Carcass measurement	HPA	LPA
Carcass width (cm)		
Males	29.8 ± 0.92[a]	26.14 ± 0.98[b]
Females	27.8 ± 0.92	30.11 ± 0.87
Buttock width (cm)		
Males	26.4 ± 0.75	23.9 ± 0.79
Females	24.1 ± 0.75	23.9 ± 0.71
Carcass compactness		
Males	0.32 ± 0.03[a]	0.18 ± 0.04[b]
Females	0.28 ± 0.03	0.26 ± 0.03
Chest roundness index		
Males	1.13 ± 0.09	1.06 ± 0.10
Females	1.17 ± 0.10	1.15 ± 0.09
Buttock perimeter (cm)		
Males	68.19 ± 1.11[a]	64.71 ± 1.18[b]
Females	65.50 ± 1.11	66.11 ± 1.04

La menor oferta de forraje gestacional afectó la conformación de la canal y los pesos musculares de la progenie de un modo sexo-dependiente

MÚSCULO	ALTA OFERTA	BAJA OFERTA
Gluteobiceps	281,71 ± 10,59 [a]	250,25 ± 10,48[b]
Machos	312,23 ± 14,19[a]	247,19 ± 14,99[b]
Hembras	251,19 ± 14,23[b]	253,31 ± 12,83[b]
Semitendinosus	99,53 ± 3,22[a]	87,94 ± 3,18[b]
Machos	109,73 ± 4,56[a]	86,54 ± 4,88[b]
Hembras	89,32 ± 4,56[b]	89,35 ± 4,08[b]
Gluteus medius	153,54 ± 6,74[x]	135,46 ± 6,65[y]
Machos	173,85 ± 9,54[a]	137,10 ± 10,19[b]
Hembras	133,24 ± 9,54[b]	133,82 ± 8,53[b]
Supraspinatus	120,09 ± 5,05[x]	108,84 ± 4,99[y]
Machos	132,65 ± 6,75[a]	105,97 ± 7,13[b]
Hembras	107,54 ± 6,77[b]	111,71 ± 6,10[b]
Semimembranosus	253,40 ± 11,26[a]	237,98 ± 11,12[a]
Machos	274,61 ± 15,39[x]	233,42 ± 16,32[y]
Hembras	232,19 ± 15,43[b]	242,54 ± 13,85[b]
Infraspinatus	121,2 ± 4,36[x]	110,9 ± 4,29[y]
Machos	132,8 ± 6,17	114,5 ± 6,59
Hembras	109,7 ± 6,17	107,4 ± 5,51



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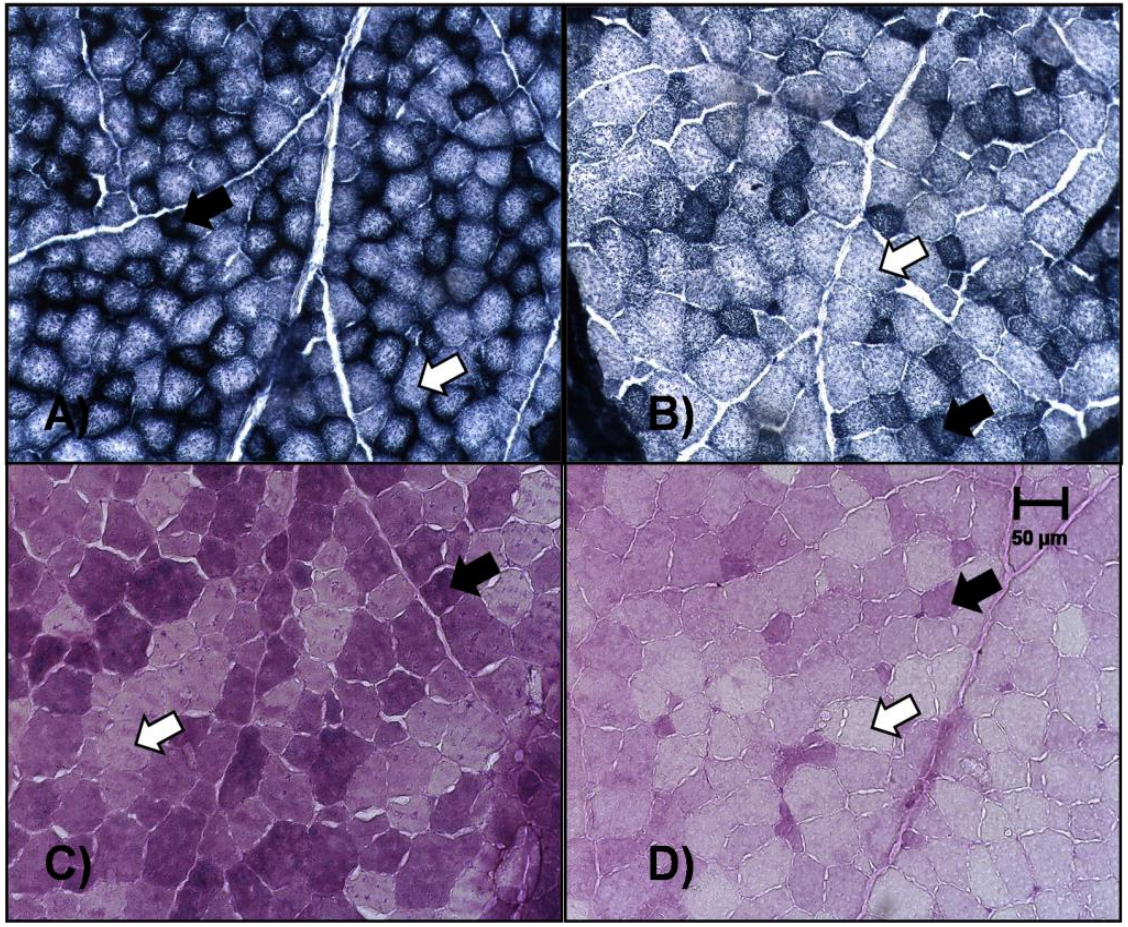
Gestational nutrient restriction under extensive grazing conditions: Effects on muscle characteristics and meat quality in heavy lambs

J. Ithurralde [a,*], R. Pérez-Clariget [a], A. Saadoun [a], P. Genovese [b], C. Cabrera [a], Y. López [c], O. Feed [c], A. Bielli [b]

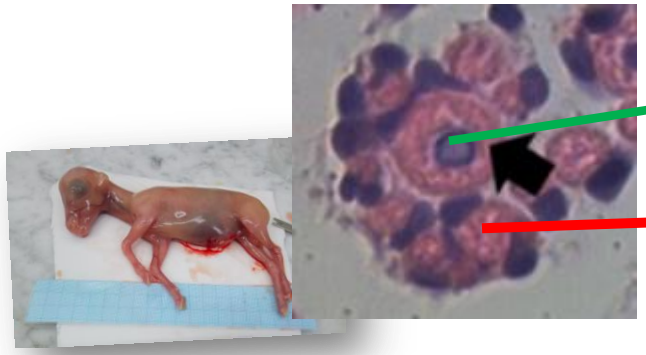
	Porcentaje de fibras oxidativas		
	AOF	BOF	P Valor
Gluteobiceps	28,98 ± 2,50^{b}	35,17 ± 2,55^{a}	0,022
Semitendinosus	19,23 ± 1,48^{b}	26,80 ± 1,46^{a}	0,002
Supraspinatus	25,84 ± 1,68^{b}	37,85 ± 1,66^{a}	< 0,0001

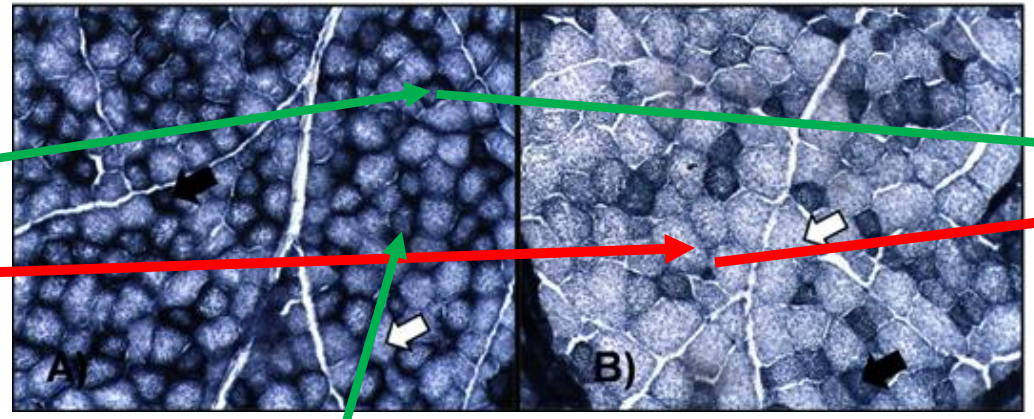
	Diámetro de fibras glicolíticas (µm)		
	AOF	BOF	P Valor
Gluteobiceps	51,34 ± 2,03^{x}	46,76 ± 2,10^{y}	0,062
Semitendinosus	47,87 ± 1,84^{a}	43,44 ± 1,88^{b}	0,032
Supraspinatus	49,25 ± 1,50^{a}	44,65 ± 1,49^{b}	0,008

	Porcentaje de fibras PAS leves		
	AOF	BOF	P Valor
Gluteobiceps	40,84 ± 3,34	39,13 ± 3,18	0,714
Semitendinosus	48,02 ± 3,87^{x}	37,85 ± 3,77^{y}	0,073
Supraspinatus	75,34 ± 6,26^{a}	50,62 ± 6,21^{b}	0,002



Los corderos nacidos de madres subnutridas presentaron músculos más oxidativos, con fibras glicolíticas de menor diámetro y menor proporción de fibras PAS leves.





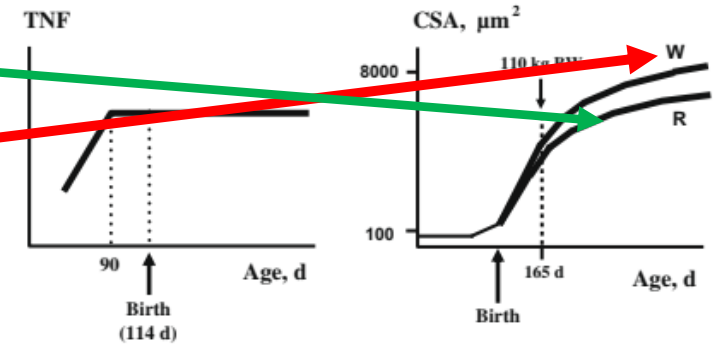


Fig. 3. Schematic representation of changes in the total number of fibres (TNF) and their cross-sectional area (CSA) in future white (W) and red (R) myofibres during development in the pig.

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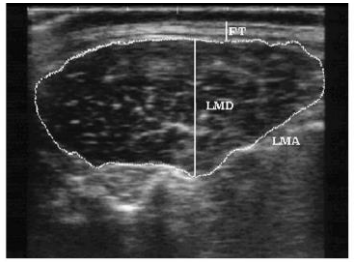

Maternal undernutrition affects secondary myogenesis in a muscle-dependent way across the major muscles of 70-day old ovine fetuses

Javier Ithurralde[a,*], Patricia Genovese[b], María José Abud[a], Álvaro López-Pérez[a], Raquel Pérez-Clariget[a], Alejandro Bielli[b]

	Longissimus lumborum		
	HPA[1]	LPA[2]	P-value
MYHC I	0.4528 ± 0.1541[y]	0.7388 ± 0.1541[x]	0.0529

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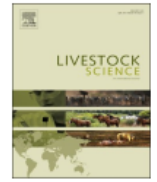


Sex-dependent effects of maternal undernutrition on growth performance, carcass characteristics and meat quality of lambs

Javier Ithurralde[a,*], Raquel Pérez-Clariget[a], Florencia Corrales[a], Danilo Fila[b], Álvaro López-Pérez[a], María de Jesús Marichal[a], Ali Saadoun[c], Alejandro Bielli[d]

Los cambios observados en la composición fibrilar se relacionaron con cambios bioquímicos musculares y de calidad de carne.

Table 6
Biochemical and meat quality traits (means ± SEM) of HPA and LPA male, female and both pooled sexes lambs in muscle *Semitendinosus*: Glycogen content (GL), Lactate content (LT), Percentage of lipids (%LP), Warner Bratzler shear force (WB) and Cooking losses (CL).

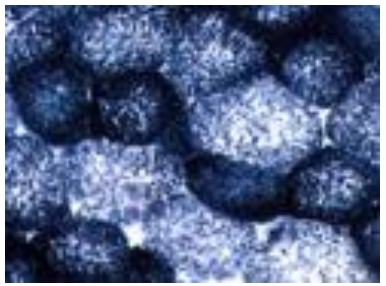
	HPA[1]		LPA[2]		*P* value Sex *treatment
	Males	Females	Males	Females	
GL (g/100 g)	0.402 ± 0.06	0.285 ± 0.05	0.433 ± 0.06	0.325 ± 0.05	0.9347
LT (g/kg)	1.09 ± 0.09	1.34 ± 0.09^{a}	1.23 ± 0.09	1.16 ± 0.09^{b}	0.0313
%LP	4.99 ± 0.70	5.65 ± 0.71	3.93 ± 0.72	5.66 ± 0.68	0.2605
WB (N)	32.25 ± 1.76	35.29 ± 1.76^{a}	34.51 ± 1.86	31.18 ± 1.67^{b}	0.0211
CL (%)	25.29 ± 1.22^{b}	27.67 ± 1.23^{x}	28.56 ± 1.27^{a}	25.47 ± 1.14^{y}	0.0069

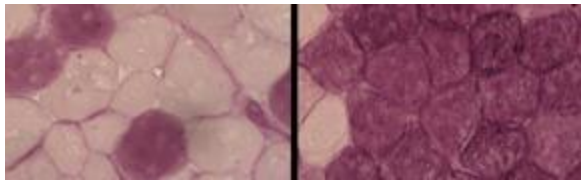
Within the same row and sex, those means followed by different superscripts differed (a vs b; $P \leq 0.05$) or tended to differ (x vs y; $P \leq 0.10$).

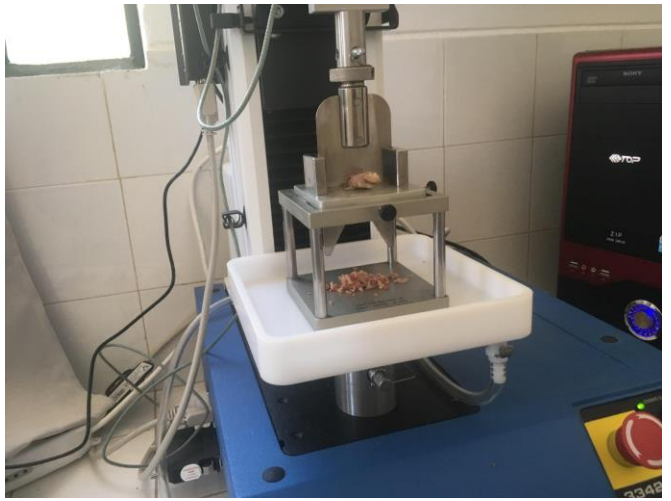
[1] HPA: High pasture allowance lambs born to ewes which grazed on natural pastures at: 14, 15 and 20 kg of dry matter/100 kg of body weight/day on days 30–60, 61–110 and 111–143 of gestation, respectively. $n = 16$ (8 males and 8 females).

[2] LPA: Low pasture allowance lambs born to ewes which grazed on natural pastures at: 6, 5 and 10 kg of dry matter/100 kg of body weight/day on days 30–60, 61–110 and 111–143 of gestation, respectively. $n = 17$ (7 males and 10 females).

La carne de las corderas nacidas de madres subnutridas presentó menor contenido de lactato y menor fuerza de corte WB.





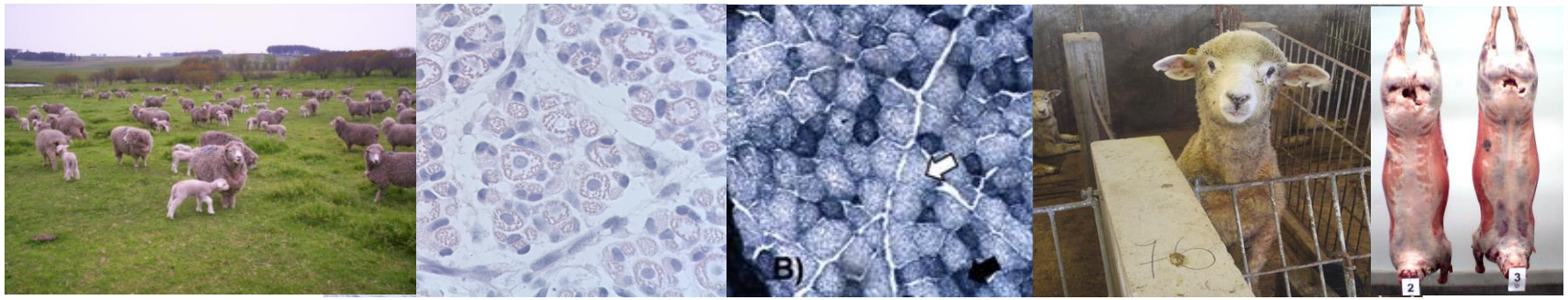


Conclusiones y consideraciones finales

A nivel nacional ha habido un importante avance reciente en el conocimiento de los efectos de programación fetal por subnutrición sobre el desarrollo muscular y la producción de carne ovina.

La investigación recientemente realizada en nuestro país permite concluir que la subnutrición gestacional es capaz de inducir efectos de programación fetal sobre el desarrollo muscular y el desempeño productivo de corderos alertando sobre la relevancia que puede tener la nutrición de las ovejas de cría durante las etapas más tempranas de la gestación.

No obstante, los trabajos en su conjunto sugieren que los efectos o la profundidad de los mismos podrían variar en función de diversos factores que incluyen: el sexo del individuo, el tipo y nivel de subnutrición, la extensión del período de subnutrición, así como también el nivel de realimentación que reciban las ovejas tras el período de restricción.



¡¡¡ Muchas gracias por su atención!!!

ORGANIZAN: inac Instituto Nacional de Carnes · INIA Instituto Nacional de Investigación Agropecuaria URUGUAY · SECRETARIADO URUGUAYO DE LA LANA