HYPERPLASTIC MUSCLE GROWTH OCCURS FROM BIRTH TO WEANING IN PIGS

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Introduction

In pigs total number of myofibers (**TNF**) is believed to be fixed at birth. However, there is evidence that at birth very small diameter myofibers containing embryonic and fetal myosin heavy chain isoforms exist. These small myofibers, which can be found in between existing primary (**P**) and secondary (**S**) myofibers, could develop into mature myofibers resulting in a postnatal increase in TNF.

Objective

The goal of the present study was to establish if the number of P and S myofibers and consequently the TNF remains constant from birth to weaning in the semitendinosus muscle (**ST**).

Materials and Methods

Experimental Design

16 female piglets

(8 pairs of littermates)

One of the 2 littermates was sacrificed either at birth (**B**) or at weaning (**W**)

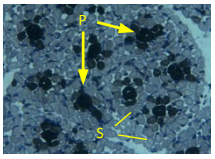
B
N = 8
average BW
(1.41 ± 0.11 kg)

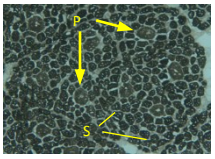
W
N = 8
average BW
(6.93 ± 0.52 kg)

Measurements assessed in the selected piglets:

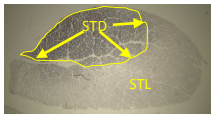
- BW at birth and weaning
- Weight of the organs (heart, kidney, liver, lung and spleen)
- Weight of the ST
- Cross sectional area (CSA)
- Number of P and S myofibers
- TNF

The number of P and S myofibers were determined in serial sections in the dark (**STD**) portion of the ST using actomyosin-ATPase staining, after preincubation at pH 4.5 (left image) and pH 10.2 (right image).





The cross sectional area of the ST (left image) and STD (right image) was determined using an anti-Slow(-I) myosin heavy chain monoclonal antibody



Results

	Treatment		SEM	P-value
	B	W		
Body weight, kg	1.41	6.93	0.527	--
	g/100 g BW			
Semitendinosus muscle	0.23	0.29	0.015	< 0.01
Spleen	0.10	0.19	0.010	< 0.01
Lungs	1.45	1.21	0.033	< 0.01
Liver	2.78	2.34	0.149	< 0.05
Heart	0.70	0.49	0.019	< 0.01
Kidneys	0.85	0.65	0.043	< 0.01

Figure 1. Number of P and S myofibers in the dark portion of the ST at birth and weaning

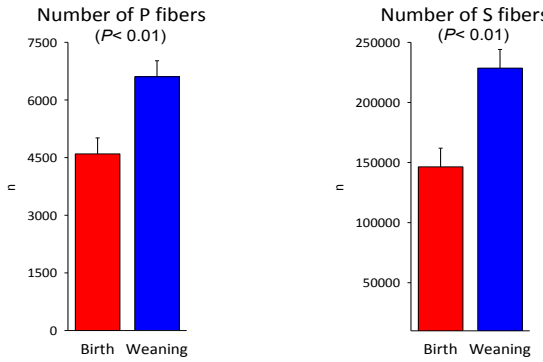
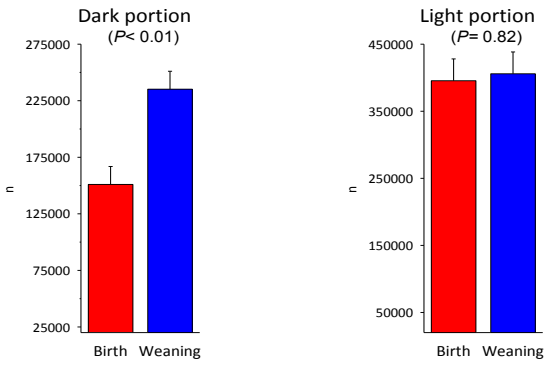


Figure 2. The TNF in the dark and light portion of the ST at birth and weaning



Conclusions:

The TNF in the dark but not the light portion of the ST increased from birth to weaning. The increase resulted from a higher number of P and S myofibers in the dark portion of the ST.

This preliminary data suggest that the TNF is not completely fixed at birth and that in some parts of the muscles myofiber hyperplasia occurs after birth.

Agroscope

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Schweizerische Eidgenossenschaft
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