ANIMAL SCIENCES GROUP
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Effect of anaesthesia and analgesia on physiology and vocalization of piglets during castration

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Background

The castration of piglets meets increasing societal resistance because it is painful. Dutch stakeholders want to know if pain relief makes castration more acceptable. In a large study carried out in 2007 we addressed the following questions regarding the use of local anaesthesia and analgesia:

1. what are the effects on pain DURING castration
2. what are the effects on pain FOLLOWING castration
3. what are the financial and practical implications of routine use with castration
4. is complete anaesthesia using CO_2 / O_2 a suitable alternative

This poster addresses the first question above.

Methods

160 piglets (3-5 days old) of 32 litters were randomly assigned to one of five castration treatments:

- CAST; castration without prior medication
- LIDO; administration of 0.8cc lidocaine intratesticular and 0.2cc subdermal, 15 min prior to castration
- MELO; 0.2cc meloxicam (Novem® 5, Boehringer Ingelheim) intramuscular, 15 min prior to castration
- L+M; combination of LIDO and MELO
- SHAM; picking up twice with 15 min interval, no castration

During castration vocalizations were recorded of 11 piglets per treatment. Blood samples were taken 15 min before castration (just prior to the administration of medication) and 20 min after castration.

Results

Cortisol increased in all treatments, with SHAM being the lowest (Table 1).

Table 1. Increase in blood parameters by castration (absolute value after castration minus before castration)

	Glucose (mmol/L)	Lactate* (mmol/L)	CK (U/L)	Cortisol* (nmol/L)
CAST	0.06	0.99[ab]	105	285[a]
LIDO	-0.04	-0.48[b]	1236	237[b]
MELO	0.45	1.35[a]	-545	282[a]
L+M	-0.18	0.62[ab]	-211	246[ab]
SHAM	0.23	0.79[ab]	356	129[c]

* Different superscripts within columns represent significant differences in log10-values between treatments ($p<0.05$)

CAST showed the highest, loudest and longest calls, SHAM the least (Table 2).

Table 2. Measures with an effect of treatment in the period between incision and removal of the second testicle (estimated marginal mean±SE).

Measure	CAST (n=11)	LIDO (n=11)	MELO (n=11)	L+M (n=11)	SHAM (n=11)
Duration p=0.022	0.807±0.068 b	0.735±0.077 ab	0.903±0.101 b	0.753±0.090 ab	0.485±0.043 a
Peak amplitude (max) p=0.005	-25.2±1.35 b	-33.5±2.22 a	-29.6±2.91 ab	-36.4±2.41 a	-31.5±2.23 ab
Main frequency (mean), p=0.032	4464±289 b	3894±490 ab	4181±561 ab	2770±459 ab	3180±174 a
Entropy (max), p=0.001	0.568±0.017 b	0.475±0.026 a	0.505±0.021 ab	0.493±0.021 ab	0.460±0.016 a

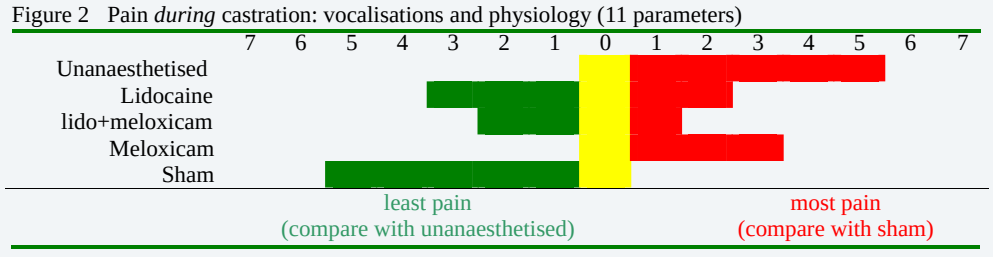
* Different superscripts within rows represent significant differences in log10-values between treatments ($p<0.05$)

In summary, compared with conventional castration, LIDO reduces the vocal expression of pain during castration, as well as the increase in cortisol. MELO has as a limited beneficial effect regarding vocalisations and no positive effect on any of the physiological parameters.

Discussion and Conclusion

We have attempted to compare the treatments on a scale. Figure 2 shows the expressions of pain during castration. The right-hand section of the figure(s) shows the number of parameters that differ from the sham group: the higher the number, the more indications of more pain. The left-hand section shows the number of parameters that differ from the unanaesthetised group: the higher the number, the more indications of less pain.

Figure 2 Pain *during* castration: vocalisations and physiology (11 parameters)



Following the presentation of these data plus the answers to the other questions mentioned above, Dutch pork chain stakeholders agreed that anaesthetics should be used as a (temporary) measure until castration can be phased out completely.

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