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Performance and carcass quality of castrates and boars fed a standard or a potato starch enriched diet

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Based on the literature, fattening boars has some key advantages over fattening castrates

- No castration needs to be done
- Higher daily gain (data not always consistent)
- Higher feed efficiency
- Higher lean meat percentage

BUT…

- Greater incidence of bad odour and flavour in the meat
- Boars have a more aggressive behaviour than castrates
- Low fat deposition may negatively affect fat quality

In Switzerland, castration of male piglets without anaesthesia will be banned January 1, 2009. **Fattening boars could be an alternative**.

The aims of the present trial were

- to evaluate growth performance, carcass quality and meat quality traits of grouped-penned boars.
- to determine the effect of feeding **r**aw **p**otato **s**tarch (RPS) on back fat skatole concentration.

Trial design

- 36 Swiss *Large White* pigs blocked by BW into 12 blocks (3 littermates per block)
  - 12 castrates
  - 12 boars
  - 12 boars offered 30% RPS the last week before slaughter
- BW at start: 21.6 ± 0.3 kg
- BW at slaughter: 105.8 ± 0.9 kg
- *ad libitum* access to the diets, which were formulated according to Swiss feeding recommendations for growing-finishing pigs

  2 phases: 20 - 60 kg BW: per kg 13.2 MJ DE;180.0 g CP
  60 -105 kg BW: per kg 13.6 MJ DE;150.0 g CP

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Parameters

- Growth performances:
  - BW determined weekly
  - Feed intake determined daily
    - Average daily weight gain
    - Average daily feed intake
    - Feed conversion ratio (FCR)
- Observation of behaviour
- Carcass characteristics
- Meat quality traits (pH, color, drip loss (after 48 h), shear force)
- Concentrations of androstenone, skatole, and indole in the backfat

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Boar taint

Androstenone, skatole, and indole are believed to be responsible for boar taint

Androstenone
(5α-androst-16-en-3one)
- Steroid produced by the testis
- Production begins at puberty
- Difficult to control its tissue concentration ⇒ maybe long-term with adapted breeding program

Skatole
(3-methylindol)
- Product of L-tryptophan microbial degradation
- Can be controlled through appropriate feeding and management strategies

Analysis were done by HPLC based on the method described by *Dehnhard et al.* (1993) and *Hansen-Møller* (1994). Fat sample were liquefied in a microwave oven. Concentrations are given in ppm in "water-free" fat.

Statistical analysis

Growth performance, carcass characteristics, and meat quality data were analysed as **ANOVA** and mean comparisons were made by the **Tukey-Kramer Test** (significance level $P < 0.05$)

In order to test treatment differences for *androstenone*, *skatole* and *indole* tissue concentrations the no-parametric **Mann Whitney U Test** was used (significance level $P < 0.05$).

Growth Performances

			Castrates	Boars (without RPS)	Boars (with RPS)	*P*-values
20-60 kg	Daily gain	g/d	828[a]	767[b]	765[b]	0.01
	Daily feed intake	kg/d	1.93[a]	1.67[b]	1.65[b]	< 0.01
	FCR	kg/kg	2.33[a]	2.17[b]	2.15[b]	< 0.01
60-105 kg	Daily gain	g/d	831	776	791	0.21
	Daily feed intake	kg/d	2.56[a]	2.07[b]	2.15[b]	< 0.01
	FCR	kg/kg	3.07[a]	2.69[b]	2.73[b]	< 0.01
20-105 kg	Daily gain	g/d	830[a]	771[b]	776[b]	0.01
	Daily feed intake	kg/d	2.23[a]	1.87[b]	1.89[b]	< 0.01
	FCR	kg/kg	2.69[a]	2.42[b]	2.44[b]	< 0.01

a, b: $P < 0.05$

Carcass quality

		Castrates	Boars (without RPS)	Boars (with RPS)	*P*-values
Dressing	%	81.6[a]	79.4[b]	79.4[b]	<0.001
Valuable cuts	%	52.6[a]	57.3[b]	56.5[b]	<0.001
Lean meat percentage (calculated)	%	51.0[a]	56.5[b]	55.5[b]	<0.001
Loin percentage*	%	23.8[a]	25.4[b]	25.3[b]	<0.001
Ham percentage*	%	17.2[a]	18.9[c]	18.3[b]	<0.001
Belly percentage*	%	17.8[a]	16.9[b]	17.4[ab]	0.04
Fat thickness (10th rib)	mm	21.8[a]	14.0[b]	15.9[b]	<0.001

a, b, c: $P < 0.05$;
* expressed per kg of the cold carcass weight

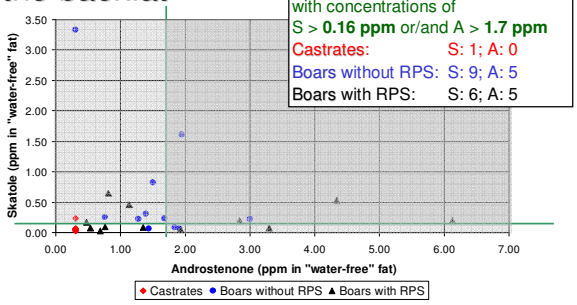
Meat quality

determined in the longissimus muscle

		Castrates	Boars (without RPS)	Boars (with RPS)	*P*-values
Initial pH (30 min postmortem)		6.16	6.15	6.14	0.91
Ultimate pH (24 h postmortem)		5.60	5.57	5.56	0.38
L* value (lightness)		50.5	50.0	50.6	0.65
a* value (redness)		6.2	6.7	6.8	0.16
b* value (yellowness)		2.8	3.0	3.2	0.52
Drip loss (after 48 h)	%	4.0	4.7	4.9	0.34
Shear force	kg	4.99	5.34	5.46	0.19

Skatole (S) and androstenone (A) in the backfat

Number of pigs (***total 12 per treatment***) with concentrations of
S > **0.16 ppm** or/and A > **1.7 ppm**
Castrates: S: 1; A: 0
Boars without RPS: S: 9; A: 5
Boars with RPS: S: 6; A: 5



Effect of RPS on skatole level in the backfat

	Boars without RPS			Boars with RPS		
	Mean	SE	Min-Max	Mean	SE	Min-Max
Androstenone	1.7	0.3	0.3 - 4.0	2.0	0.5	0.5 - 6.1
Skatole	0.85[a]	0.33	0.06 -3.34	0.22[b]	0.06	0.03 - 0.64
Indole	0.10	0.04	0.02 -0.51	0.09	0.02	0.02 - 0.25

[a,b]: $P < 0.05$

Behaviour

- Boars and castrates were filmed twice
- Boars were more active than castrates
- In particular, boars displayed more active sexual behaviour than castrates
- Increased sexual behaviour might have negatively affected growth performance, feed intake and feed efficiency

Conclusions

- Average daily gain and feed intake of boars lower than of castrates
  - active sexual behaviour?
  - less appetite?
- Higher feed efficiency
- Leaner carcasses

- Meat quality traits (pH, colour, drip loss, shear force) did not differ between treatments
- RPS reduced skatole, but not indole concentrations in the backfat
- Androstenone concentration rather high and unaffected by RPS, is difficult to control