THE EFFECT OF CANADIAN BLOODROOT AND THE RN- ALLELE ON PORK CARCASS AND MEAT QUALITY

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Background

The Bloodroot plant has been traditionally used by the First Nations peoples as a source of red dye for clothes and body paint. It is found throughout North America and was known to also have medicinal properties useful for the treatment of bronchitis, topical fungal infections and intestinal parasites. The active ingredients in bloodroot are primarily the alkaloids, Sanguinarine, Chelerythrine and Protopine. Purified Sanguanarine marketed under the name of Sangrovit, has been recently reported to have probiotic properties occasionally leading to improved cost effective feed efficiency in commercial swine operations, when added to the diet at 30 ppm for the grower finisher phase of production (Pedersen 1996). The alkaloids Sangunairine and Cheleytherine are also known inhibitors of the enzyme P450-2e1, which can convert tryptophan into skatole, the cause of sex taint in swine. The effect of bloodroot was tested in normal and RN- type pork. RN- animals typically have 2-3X more muscle glycogen which leads to a lower pH paler color and higher drip loss *post mortem.* (Milan et al. 2000).

Objectives

To examine if dried bloodroot would improve feed efficiency, pork colour and lower skatole content in commercial swine. Determine muscle glycogen and bloodroot interactions on pork flavor.

Methods

Whole dried bloodroot was fed at 0.2 % (~ 30ppm Sanguinarine content) to 28 barrows for the last 24d of finishing. Blood samples and body weights were measured before and after the 24d trials. Blood plasma was tested for skatole content using HPLC (Babol et al., 1999). Carcass backfat levels and lean yield was estimated using the Hennessy probe at the 13^{th} rib. Pork loin color and marbling was measured 48h post mortem from center cut loin pork chop (Meadus & MacInnis, 2000). Pig DNA was isolated to test for the Rendemont Naplole (RN-) mutation in the PRKAG3 gene that causes excessive accumulation of muscle glycogen (Meadus et al. 2002). The glycogen is broken down *post mortem* and is estimated by the Glucocidic potential (GP) = lactate + 2(glycogen + glucose + glucose-6-phosphate) in the meat using a YSI 2300 Stat analyzer (YSI Inc, Dayton, OH, USA). Although the glucose concentration steadily increases between day 1 to day 4 in the meat, GP estimates are relatively unchanged **Figure 3**.

Results and Discussion

In **Table 1** Preliminary results showed that 0.2% bloodroot had no significant effect on carcass yield or meat quality measures of colour, pH or plasma skatole content in the barrows. Bloodroot did however reduce the glucidic potential in the loin muscle from both normal and high glycogen pig genotypes **Figure 1**. The bloodroot fed animals showed a tendency towards reduced ADG and better gain to feed intake which improved the lean yield % estimates. The barrows were all well below the acceptable skatole limit of 2ppm before the start of the bloodroot feeding.

Table 1. The effect of adding 2% bloodroot to the finisher diet of barrows (n =28) for the final 14 days of growth before processing. The barrows were evaluated for growth efficiency, lean meat yield and pork quality. Color scores (L*, a*, b*) were measured with a Minolta color meter on 2d old chops. Skatole concentration was measured from plasma samples.

	Control	Bloodroot	(C-B) P value
Feed/Gain	3.206 ± 0.55	3.038 ± 0.09	0.27
Average Daily Gain	1.193 ± 0.15	1.133 ± 0.11	0.25
Estimated Yield (%)	59.4 ± 1.04	59.9 ± 0.89	0.13
pH 48h	5.5 ± 0.04	5.5 ± 0.05	0.78
Marbling score (visual)	1.6 ± 0.63	1.6 ± 0.77	0.95
L* (dark to light)	56.9 ± 1.90	56.0 ± 2.03	0.22
a* (green to red)	6.6 ± 1.16	6.2 ± 1.29	0.40
b* (blue to yellow)	7.7 ± 1.02	7.3 ± 1.14	0.26
Skatole (ppm)	1.6 ± 1.66	1.7 ± 1.86	0.84

Conclusions

- Bloodroot had no significant effect on pork quality and did not improve meat color.
- Bloodroot showed some influence on lean yield % but this may have been more due to reduced feed consumption due to the new taste of the modified feed.
- The RN- allele increased the glucidic potential in the pork loins and was significantly higher after 4 days at +4C.
- The addition of bloodroot reduced GP by ~4% ($p < 0.1$) in both the normal and RN- type pork.

References

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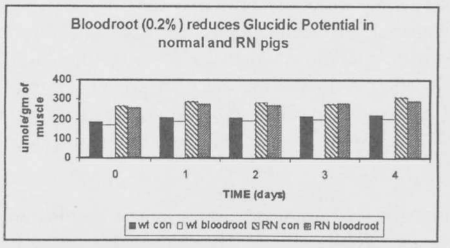

Figure 1. The effect of bloodroot on pork Glucocidic Potential (GP) in normal pigs and pigs carrying the RN- mutation.

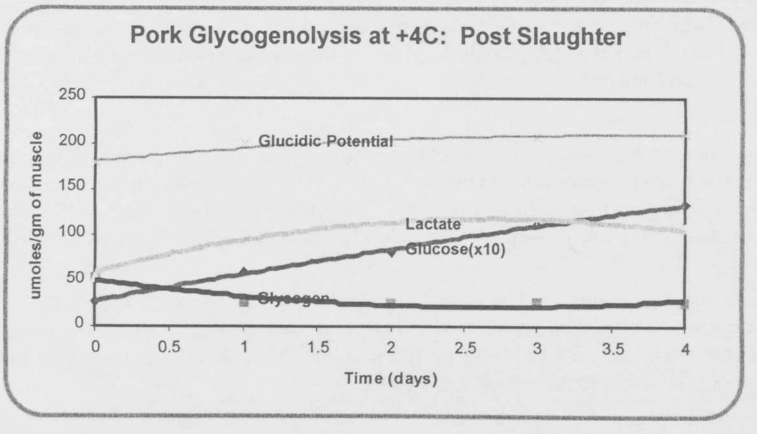

Figure 2. The effect of post mortem glycogenolysis in pork loins over 4d at +4C.