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Addition of algae in pig feed: influence on technological quality and composition of meat and offal

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Background

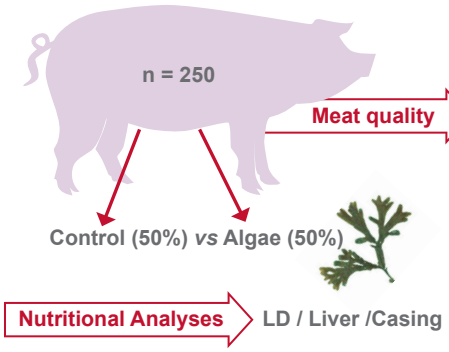
Nowadays, algae progressively emerges in farms as a new generation of natural ingredients that improves immune function and animal health [1]. But, what are the effects of algae addition on meat and offal ? This study assesses the impact of pork feed supplemented in algae on meat quality, its composition, including nutritional compounds in offal.

Materials & Methods

250 pigs, from Piétrain sires, which have received a basal diet (control) for half of them or a supplemented diet with algae for the other half (algae), were slaughtered at Jean Floc'h slaughterhouse (Loudeac Viande, France).

Quality trait measurements were performed at slaughterhouse and samples of LD, liver and pork casing were selected for analyses.

Algae effect was assessed by using the GLM procedure (SAS Institute, USA). FREQ procedure was applied on PSE-like zone class data.



M. *Semimembranosus* (SM):
- pH1 (30 min *post mortem* (*pm*));
- pH24 (24H *pm*).

Inside of deboned Ham:
- PSE-like zone classification [2].

M. *Longissimus Dorsi* (LD):
- Colour at 32H *pm* with CR-400 colorimeter;
- Drip loss according to EZ method [3].

Fig. 1: Measurements on LD muscle

Results & Discussion

Table 1: Effect algae on meat

	Carcass data		SM (n=231)		LD (n=231)			PSE-like zone class (%) (n=230)			
	Carcass weight (kg)	Lean meat content	pH1	pH24	pH24	L*	Drip Loss (%)	1	2	3	4
Control	90.48	61.6	6.58	5.79	5.64	50.5	4.19	63.5	32.2	4.4	0.0
Algae	88.65	61.3	6.64	5.75	5.62	51.0	4.59	62.8	35.5	0.8	0.8
p	*0.094*	*0.305*	*0.012*	*0.072*	*0.198*	*0.220*	*0.180*			*0.252*	

class 1 = no defect;
class 2 = slight defect;
class 3= deep defect on SM;
class 4= deep defect on several muscles (incl. SM)

No significant effect of algae on PSE-like zone defect frequency.

No major effect on pH24, colour and drip loss with exception on pH1, slightly improved by the algae (+ 0.06).

Table 2: Effect of algae on meat composition

	LD (n= 40)			Liver (n=20)			Liver (n=20)		
	Control	Algae	*p*	Control	Algae	*p*	Control	Algae	*p*
Humidity (%)	74.80	74.10	*0.010*	-	-	-	73.04	76.64	*0.154*
Protein (%)	23.10	23.11	*0.920*	-	-	-	8.88	9.53	*0.128*
Lipid (%)	1.13	1.42	*0.119*	-	-	-	17.02	12.99	*0.153*
Mg (mg/100g)	*26.57*	*27.65*	*0.022*	21.50	21.80	*0.777*	*10.80*	*12.50*	*0.066*
Zn (mg/100g)	*1.40*	*1.51*	*0.053*	8.76	9.71	*0.547*	*1.39*	*1.30*	*0.247*
B12 (µg/100g)	*0.229*	*0.289*	*0.027*	21.74	29.82	*0.002*	*1.726*	*1.345*	*0.059*
B6 (mg/100g)	*0.444*	*0.534*	*0.001*	0.385	0.282	*0.010*	*0.023*	*0.024*	*0.714*

Algae did not change the level of lipid and protein (intended result).

Algae increased the level of magnesium, zinc and group B vitamins in pork loin. Similar effect was observed on B12 in liver.

Conclusion

An algae supplementation slightly improves the pH1 that could probably reduce the susceptibility of pork to the development of PSE meat but, we did not find this difference on the drip loss values. Composition of pork loin was enhanced by algae supplementation with higher level in minerals and group B vitamins.

[1] Berri, M., Olivier M., Holbert S., Dupont J., Demais H., Le Goff M., Nyvall Collen P. (2017) Ulvan from Ulva Armoricana (Chlorophyta) Activates the PI3K/Akt Signalling Pathway via TLR4 to Induce Intestinal Cytokine Production. Algal Research (28): 39–47.
[2] IFIP. 2005. Grille de notation du défaut « déstructuré » des muscles de la cuisse de porc.
[3] Rasmussen, A., Andersson, M. (1996). New method for determination of drip loss in pork muscles. 42nd ICoMST.