POLYSACCHARIDES FAT SUBSTITUTE REGULATED THE DIGESTIBILITY OF PROTEIN IN EMULSION-TYPE SAUSAGE

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I. INTRODUCTION

Dietary fibers are promising choices, since they help to increase emulsion stability, water and fat holding capacity, reduce cooking losses, improve texture and juiciness and serve as prebiotics preventing diseases [1]. Even though dietary fibers are widely used as fat replacer in meat product, less is known about their influence on the digestion process of other nutrients such as meat protein. This work used emulsion-type sausage to study the influence of three polysaccharides (konjac gum (KG), xanthan gum (XG) and sodium alginate (SA)) fat replacer on the digestibility of proteins.

II. MATERIALS AND METHODS

The specific formulations of 10 different emulsion-type sausages were listed in Table 1. Digestion were according to Ding et al. [2]. The digests were observed by CLSM [2]. The pepsin activity was measured based on the supplementary in the publication of Minekus [3].

Table 1. Ingredients list of the prepared emulsion-type sausage.

Ingredients list	Control	30% replacer	50% replacer	80% replacer
Lean meat	68.3	68.3	68.3	68.3
backfat	18.0	12.6	9.00	3.60
Water	10.0	15.1	18.5	23.6
Sodium chloride	1.60	1.60	1.60	1.60
Sugar	2.00	2.00	2.00	2.00
Sodium tripolyphosphate	0.300	0.300	0.300	0.300
Sodium nitrite	0.003	0.003	0.003	0.003
Polysaccharides	0.00	0.300	0.500	0.800

III. RESULTS AND DISCUSSION

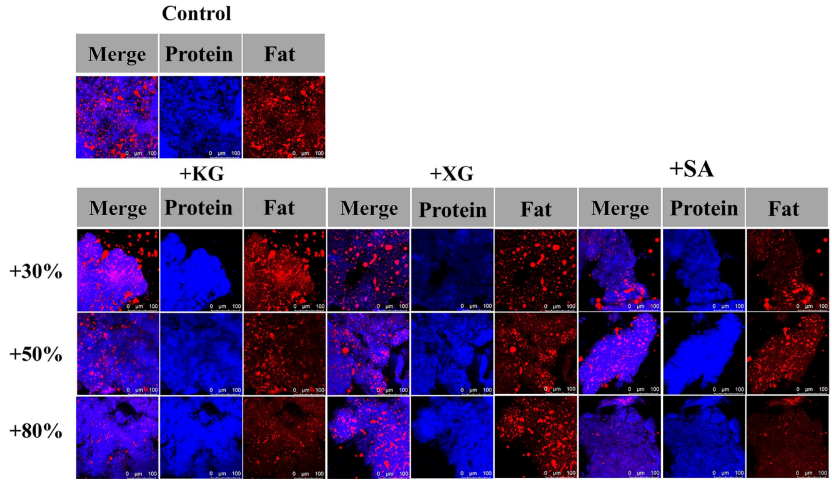

Figure 1. CLSM images of gastric digests of emulsion-type sausage with and without the addition of polysaccharide fat replacers.

In Figure 1, the presence of polysaccharides or reduction of fat seemed to strengthen the interaction among protein digests. After the whole gastrointestinal digestion, most protein was digested into much smaller and loose digests in the control sample, whereas larger and more solid structures are found in the digests of the sample with polysaccharide (Figure 2). These results clearly indicate the negative effect of the addition of polysaccharides on the digestibility of meat proteins.

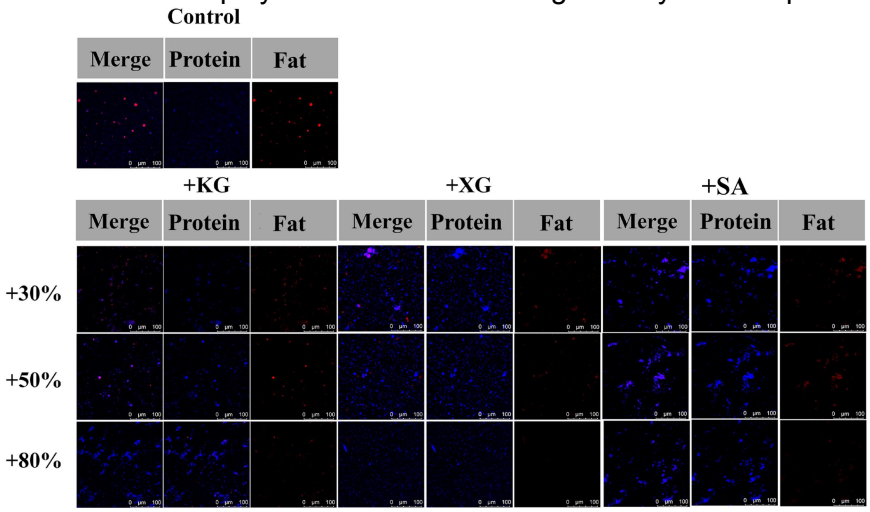

Figure 2. CLSM images of gastrointestinal digests of emulsion-type sausage with and without the addition of polysaccharide fat replacers.

In Table 2 , the pepsin activity decreased from 6105.9 to 3896.2, 5358.4 and 3715.8 when 0.4% KG, XG and SA were added, respectively. This result clearly reflects the inhibition of these hydrophilic polysaccharides on pepsin activity.

Table 3. Changes in pepsin activity affected by the addition of KG, XG or SA. The lowercase letters (a-c) indicate the significance levels.

samples	Pepsin activity (U/mg)
Control	6105.9±326.8^{a}
+ KG	3896.2±230.7^{c}
+ XG	5358.4±307.6^{b}
+ SA	3715.8±218.4^{c}

IV. CONCLUSION

This work demonstrated that polysaccharides fat replacer changed the in vitro digestibility of proteins. KG and SA largely reduced the digestibility of protein by suppressing the activity of pepsin.

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