EFFECTS OF DIETARY FIBERS ON THE QUALITY CHARACTERISTICS OF PORK BLENDS

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I. INTRODUCTION

Recently, dietary fiber, one of the functional materials has received attention in the meat processing industry. Dietary fiber is defined as derivatives, oligosaccharides, and polysaccharides that are not degraded by intestinal digestive enzymes. There are two main purposes of using dietary fiber in the meat processing industry. In physiological aspect, dietary fiber is used to satisfy the needs of consumers by producing well-being products that impart functionalities such as colonic diseases, constipation, cardiovascular diseases and adult disease and control of blood cholesterol (Choi et al., 2007). In a physical aspect, dietary fiber is used to improve quality characteristics of final meat products such as water binding capacity and texture properties (Cofardes et al., 2000). Therefore, this study was conducted to investigate the effects of dietary fibers on quality characteristics of pork blend.

II. MATERIALS AND METHODS

Dietary fibers were chicory fiber (Lyntz Inc., Seoul, Korea), brown rice bran fiber (Cheolwon Agricultural Union Corporation, Cheolwon, Korea), wheat fiber (J. Rettenmaier & Sohne GMBH + Co. KG, Berlin, Germany), and indigestible maltodextrin (Edentown FnB, Seoul, Korea). Pork blend was manufactured with added 1.5% NaCl and 0.2% STPP to 100g grounded pork loin, and then the dietary fibers were added. The 5 treatments were as follows; C (Control): No addition, T1: 1.5% rice bran fiber + 1.5% indigestible maltodextrin, T2: 1.5% rice bran fiber + 1.5% Chicory fiber, T3: 1.5% wheat fiber + 1.5% indigestible maltodextrin, T4: 1.5% wheat fiber + 1.5% chicory fiber. Analysis traits were pH, Water Holding Capacity (WHC), cooking loss, meat color and texture properties. All trials were three replicates.

III. RESULTS AND DISCUSSION

Table 1. Physicochemical characteristics of pork blends with dietary fibers

Traits*		C	T1	T2	T3	T4
pH		6.10±0.02^b	6.18±0.01^a	6.20±0.01^a	6.09±0.01^b	6.11±0.00^b
WHC (%)		75.89±3.14	73.81±2.41	75.65±4.76	72.19±0.94	76.28±2.84
Cooking loss (%)		3.34±0.11	2.95±0.23	2.90±0.08	3.42±0.15	3.74±0.66
Hunter Color	L*	42.08±1.20^b	48.65±2.95^a	48.11±3.85^a	50.30±2.94^a	50.38±1.62^a
	a*	8.24±0.64	9.07±0.91	9.66±1.09	9.34±0.42	8.70±1.65
	b*	11.53±0.32^b	14.26±0.49^a	14.49±1.05^a	12.60±1.24^b	12.81±1.25^b

*C (Control): No addition, T1: 1.5% rice bran fiber + 1.5% indigestible maltodextrin, T2: 1.5% rice bran fiber + 1.5% chicory fiber, T3: 1.5% wheat fiber + 1.5% indigestible maltodextrin, T4: 1.5% wheat fiber + 1.5% chicory fiber

L*: lightness, a*: redness, b*: yellowness

^{a,b}Means±SD with different superscripts in the same row differ significantly (p<0.05).

Table 1 shows physicochemical characteristics of the pork blends added with dietary fibers. The T3 and T4 did not exhibit significant differences in pH, but T1 and T2 was significantly higher than the control. Similar results were observed for pH of pork emulsion containing rice bran fiber (Choi et al., 2007). The addition of dietary fiber had no significant effect on WHC and cooking loss. In the color, the L* value of control was significantly higher than the all treatments, and the b* values of T1 and T2 were significantly higher than the control. The a^* values had no significant differences among the pork blends.

Table 2. Texture properties of pork blends with dietary fibers

Traits*	C	T1	T2	T3	T4
Springiness (%)	76.37±5.23	76.24±6.34	76.95±2.51	80.65±3.04	83.17±6.07
Cohesiveness (%)	44.03±2.18^{b}	44.68±4.67^{b}	47.07±3.55^{ab}	50.97±2.04^{a}	48.79±3.27^{ab}
Chewiness (kg)	0.33±0.10	0.31±0.03	0.33±0.02	0.36±0.03	0.37±0.07
Hardness (kg)	0.23±0.05^{b}	0.24±0.03^{ab}	0.26±0.01^{ab}	0.28±0.03^{a}	0.28±0.04^{a}

*C (Control): No addition, T1: 1.5% rice bran fiber + 1.5% indigestible maltodextrin, T2: 1.5% rice bran fiber + 1.5% chicory fiber, T3: 1.5% wheat fiber + 1.5% indigestible maltodextrin, T4: 1.5% wheat fiber + 1.5% chicory fiber
^{a,b}Means±SD with different superscripts in the same row differ significantly (p<0.05).

Table 2 shows texture properties of the pork blends with dietary fibers. The springiness and chewiness had no significant differences among the pork blends, but the cohesiveness and hardness of T3 were significantly higher than the control. Choi et al. (2008) reported that addition of dietary fibers to meat products enhances the binding capacity and emulsifying capacity of raw meat, and thus it is possible to produce products having excellent texture characteristics.

Table 3. The storage characteristics of pork blends with dietary fibers

Traits*	C	T1	T2	T3	T4
TBA (mg malonaldehyde/1,000g)	0.12±0.01^{b}	0.23±0.08^{a}	0.20±0.03^{ab}	0.21±0.01^{a}	0.21±0.05^{a}
VBN (mg%)	20.45±0.54^{a}	17.11±0.31^{bc}	18.21±1.14^{b}	16.92±0.57^{c}	17.02±0.27^{bc}
TMC (log cfu/g)	5.54±0.01^{c}	5.81±0.01^{b}	5.97±0.01^{a}	6.00±0.00^{a}	5.96±0.01^{a}

*C (Control): No addition, T1: 1.5% rice bran fiber + 1.5% indigestible maltodextrin, T2: 1.5% rice bran fiber + 1.5% chicory fiber, T3: 1.5% wheat fiber + 1.5% indigestible maltodextrin, T4: 1.5% wheat fiber + 1.5% chicory fiber
$^{a\text{-}c}$Means±SD with different superscripts in the same row differ significantly (p<0.05).

The storage characteristics of the pork blends with dietary fibers are shown in Table 3. The TBA values of pork blends with added dietary fibers except for T2 were significantly higher than the control. The VBN values of control were highest among the pork blends, and the TMC of pork blends with added dietary fibers were significantly higher than the control.

IV. CONCLUSION

The addition of dietary fibers did not affect the water holding capacity and cooking loss of pork blends. In the texture properties, addition of dietary fibers slightly improved the cohesiveness and hardness. Also, the addition of various dietary fibers was increased lightness, total microbial count, and TBA values, whereas VBN decreased. As a result, addition of dietary fibers has a no adverse effect on pork mixture and it suggest that dietary fibers can be utilized in meat products.

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