

Development and Utilization of Five Kinds of Fresh Bone

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SUMMARY

This article describes the useful value of animal fresh bone. Five kinds of animal bones were investigated according to chemical composition, nutrition and processing technology by a lot of experiments. Animal fresh bone was ground into finely ground paste which had almost the same chemical composition as meat. The paste of fresh bone contains Ca and P, 10 - 20 times more than meat dose. The paste may replace 10-20 % of the meat in sausage, luncheon meat and other ground meat products, without adverse affects on quality.

INTRODUCTION

In China, the shortage of Ca greatly affects the health of olders and children. There are several millions of people that break their bones every year. Elder people become bridle bones and over 80% of the children suffer from dental caries.

It was investigated that 40-80 % of all babies have anaemia because of malnourition. It is a urgent problem to solve the shortage of Ca, Fe and Protein.

MATERIALS

We investigated five kinds of fresh bones: ox bone, sheep bone, pig bone, goose bone and chicken bone. All bones must not be polluted. The bones came from different parts of the animal body, so called "mixed bone sample".

RESULTS

Nutritional Composition of Bone Paste

Content	ox bone paste	sheep bone paste	pig bone paste	goose bone paste	chicken bone paste
Pr (%)	43.02	40.36	40.7	44.26	46.5
Fat (%)	28.5	40.7	39.7	34.8	41.5
Moisture (%)	75	73	70	68	12
Calorie values (kcal/100g)	85	145	244.6	152	165
Ca (%)	6.14	3.99	4.95	5.22	3.89
P (%)	5.51	4.11	6.56	4.43	2.29
K (ppm)	2266.24	3263.46	2480.02	2217.87	4231.57
Na (ppm)	3435.27	2153.15	1630.09	1890.44	1760.75
Mg (ppm)	6462.27	1961.71	1920.06	1729.82	1780.91
Cu (ppm)	13.42	2.79	22.28	34.51	4.85
Zn (ppm)	101.31	160.87	98.01	134.68	110.82
Fe (ppm)	618.35	493.18	595.22	793.14	238.24
Mn (ppm)	5.75	4.65	4.87	11.56	4.85
Ash (%)	27.4	17.6	16.7	18.6	10.5

(Pr, Fat and Ash are based on dry material)

Amino Acid Contents in Bone Paste

aa	ox bone paste	sheep bone paste	pig bone paste	goose bone paste	chicken bone paste
ASP	2.98	2.78	2.63	3.12	4.32
Thr	1.01	1.07	0.94	1.25	1.84
Ser	1.34	1.22	1.21	1.37	1.84
Glu	5.12	4.99	4.88	5.51	7.26
Gly	6.97	5.93	5.97	6.64	5.36
Ala	3.58	3.31	3.89	3.89	3.97
Val	1.40	1.39	1.47	1.67	2.22
Met	-	0.05	0.07	0.35	0.07
Ile	1.00	0.88	0.88	1.16	1.77
Leu	2.23	2.11	1.98	2.39	3.47
Tyr	0.87	0.51	0.50	0.79	0.93
Phe	1.14	1.07	1.05	1.33	1.63
Lys	1.88	1.98	1.93	2.20	3.26
His	0.55	0.60	0.62	0.64	1.07
Arg	3.13	2.79	2.63	3.08	3.54
Pro	4.09	3.50	3.45	3.90	3.26
Total	37.29	34.18	33.55	39.28	45.81

Receipts of Meat Products with Bone Paste: SAUSAGE (based on 50 kg pork)

- Control sample:
pork 50 kg; Stach 11 kg; salt 1.75 kg; sugar 1.5 kg; other ingredients
- Ox bone paste sausage:
pork 45 kg; ox bone paste 5 kg; others same with control sample
- Sheep bone paste sausage:
pork 45 kg; sheep bone paste 5 kg; others same with control sample
- Pig bone paste sausage:
pork 42.5 kg; pig bone paste 7.5 kg; others same above
- Goose bone paste sausage:
pork 42.5 kg; Goose bone paste 7.5 kg; others same with control sample
- Chicken bone paste sausage:
pork 40 kg; chicken bone paste 10 kg; others same with control sample

Nutrients of the Products:

	control sample	ox	sheep	pig	goose	chicken
moisture (%)	58.7	60.6	59	57	59.2	59.1
ash (%)	2.69	3.12	3.08	3.2	3.3	3.5
Pr (%)	31.36	28.91	26.31	26.51	30.79	26.56
fat (%)	25.5	27.0	28.1	29.5	25.8	25.6
Ca (%)	0.066	0.715	0.578	0.690	0.920	0.931
P (%)	0.335	0.66	0.601	0.583	0.710	0.712

Market Price:

sausage	control sample	ox 1	sheep 2	pig 3	goose 5	chicken 5
Market price YMBY/kg	7.38	6.78	6.76	6.64	6.47	6.48

Receipts of Luncheon Meat with Bone Paste (based on 50 kg pork)

- Control sample:
pork 50 kg; starch 12.50 kg; mixed powder 12.5 kg; salt 2.3 kg; sugar 1.5 kg; green beans 1.5 kg; other ingredients
- Ox bone paste luncheon meat:
pork 45 kg; Ox bone paste 5 kg; Starch 11.5 kg; others same with control sample
- Sheep bone paste luncheon meat:
pork 45 kg; sheep born paste 5 kg; starch 11.5 kg; others same with control sample
- Pig bone paste luncheon meat:
pork 42.5 kg; pig bone paste 1.5 kg; starch 10.5 kg; others same with above
- Goose bone paste luncheon meat
pork 42.5 kg; goose bone paste 7.5 kg
- Chicken bone paste luncheon meat
pork 40 kg; chicken bone paste 10 kg; others same with control sample

Market Price

	control sample	ox 1	sheep 2	pig 3	goose 4	chicken 5
Market price YMBY/kg	6.13	5.63	5.65	5.55	5.40	5.44

CONCLUSIONS

- On many aspects, bone paste has higher nutritional values than meat has. It contains a great quantity of Ca and P. The proportion of Ca and P is about 1 - 2:1, which improves unreasonable proportion of Ca and P in meat.
- The bone paste sausage and Luncheon meat contain much more nutritions. The contents of Ca and P are much higher than in the control sample. From the table of market price, we can know that both kinds of bone products have the same qualitates as control samples, but their prices are lower, so we say its social benefits and economical profits are notable.
- Five kinds of bone paste have a little different characteristics. We should use different volumes to replace pork. The paste may replace (10 to 20)% of meat in sausage and luncheon meat, without adverse effects on quality.