ABBATOIR BY PRODUCTS AS SEMI MOIST PET FOOD

A.S.F.H. BARRETO
A.M.R. RIBEIRO

Escola Superior de Medicina Veterinária
Rua Gomes Freire, 1199 Lisboa Codex
PORTUGAL

INTRODUCTION

Pet foods are grouped in three classes according to water content: dry, moist and semi moist food.

Dry foods have generally higher nutritional and energy values. They are complete and balanced diets. They also provide the use of easier and less expensive technics of package and storage. However, the voluntary food intake by the animal for this type of food is not always the best, hence the need to add water to these products becomes a normal procedure.This improves the texture of the food but does not affect or increase the voluntary food intake besides being less stable and easily degradable if it is not promptly consumed.

On the other hand, moist foods are usually well accepted by the animal due to their good texture, hardness and flavour. However, the high water contents demands a drastic thermal processing and a perfectly sealed package in order to obtain a stable and sterile product and these procedures do increase considerably all custs. Furthermore, once unsealed the package, the food must be consumed without delay or refrigerated to avoid spoilage.

Semi moist foods combine the advantages of the two other groups. They are complete and balanced diets,with good texture and flavour,being self stable products under ordinary storage conditions. These good characteristics are specially due to the basic raw material used (more than 50% of meat products), and stability obtained with the use of dry ingredients and additives conditionning aW and pH. The use of refused meats and abbatoir subproducts do not impose sanitary restrictions as they are removed by adequate heat treatment.

MATERIALS AND METHODS

The most important causes of rejection of meat products for human consumption in public abbatoirs were analysed before selecting the raw materials to be actually used which included, cow udders, refused tallow, livers and meat of beef cattle and swine lungs. Subsidiary dry materials were fat-free soya meal (44% crude protein),rice grits and a premix containing vitamins for nutritional balence, sodium chloride propylenoglycol, potassium sorbate, sodium nitrite, butil-hidroxyanisol (BHA) and citric acid as stabilizers and dye Ponceau 4R (E124) and meat/liver flavourings as appetizers (Annex I).

Analysis of ingredients (Annex II) was conducted to establish their sanitary safety and chemical composition; the last mentioned data was introduced in appropriate software in order to calculate a diet containing 35% of water, 21% of crude protein, 15% of lipids, 5.2% of total ash, 23.8% of carbohydrates, 2.39% of crude fibre, 0.67% of calcium, 0.40% of phosphorus and 3000 kcal/kg of metabolizable energy.

Minced meat products from the daily slaughter were steam sterilized for 1 hour in sealed containers after the required temperature of 121°C at the core was reached, and subsequently quickly cooled down to 5°C. They were then grinded through a 8 mm diameter sieve transfered to a blade mixer where computed amounts of fat-free soya meal and rice grits (previously treated in a microwaves oven during 15 minutes) and a premix was added.

The final blend was introduced into light and vapour proof plastic casings 50 mm diameter, and clipped in 500 g weight "sausages". A final pasteurization was made in a water bath at 80°C for 60 minutes, followed by cooling and storage at room temperature. Monthly, microbiological analysis was conducted to evaluate total plate count, D-Group Streptococci, coliforms and faecal coliforms, Staphylococci, sulfite reducing Clostridium spores and Salmonellae. Chemical analysis included the assessment of the weight loss at 105°C,crude

protein, ether extract, total ash, carbohydrates, crude fibre, chlorides, nitrites, TBA, peroxide value, aW, pH and metabolizable energy (protein and carbohydrate values were multiplied by 3.5 and those of ether extract by 8.46).

During that time, feeding tests were made with Epagneul Breton hunting-dogs, with a single daily meal in variable amount, according to the maintenance requirements based on body weight plus 20% for activity increment.

Allowance Scale

Body Weight (kg)	Feed (kg) / Day
10	0.3
15	0.5
20	0.7
25	0.8
30	1.0
35	1.1
40	1.3

RESULTS

Microbiological and chemical analysis were made every 30 days after production during one year. Results are shown in Annex III and IV.

CONCLUSION

Chemical and microbiological quality control of the product made during the storage time shows its stability at temperatures from 18°C to 20°C for at least one year.

From voluntary food intake and nutritional trials it was concluded that dogs show a good voluntary food intake to this food which also covers the animal requirements even when submitted to intensive work.

REFERENCES

Anderson, R.S. (1978):
Nutrition of the Dog and Cat. International Symposium on Nutrition of the Dog and Cat, Hanover FRG.

Anderson, R.S. (1986):
Nutrition of the Growing Dog. World Congress WSAVA, Paris.

Edney, A.T.R. (1988):
Dog & Cat Nutrition. Woltham Centre for Pet Nutrition, UK.

Luck, E. (1977):
Conservacion Quimica de los Alimentos. Edicion Española. Editorial Acribia, Zaragoça.

National Research Council (1985):
Nutrient Requirements of Dogs. National Academy Press, Washington.

National Research Council (1986):
Nutrient Requirements of Cats. National Academy Press, Washington.

Rockland, L.D. and Beuchat, L.R. (1987)
Water Activity: Theory and Applications to Food. Institute of Food Technologists, Chicago, Illinois.

ANNEX I - FOOD COMPOSITION

Udders (cow)	200
Tallow	110
Liver (cattle)	100
Meat (cattle)	10
Lung (swine)	100
Fat-free soya meal (44%)	330
Rice grits	90
Propyleneglycol	30
Calcium carbonate	8
Citric acid	6
Carrageen (535 DANAGEL P FS 44)	5,6
Salt	5
Potassium sorbate	3
Calcium phosphate	1
BHA and BHT	0.5
Sodium nitrite	0.3
Dye (PONCEAU 4R)	0.25
Meat flavour	0.20
Powdered garlic	0.15
Vitamines	0.20
Vitamine A	2 600 000 IU
Vitamine D	325 000 IU
Vitamine E	32 g
Vitamine K	52 mg
Thiamine (B1)	650 mg
Riboflavin (B2)	1.6 g
Pantothenic acid	7 g
Pyridoxine (B6)	780 mg
Folic acid	140 mg
Vitamine B12	17 mg
Choline chloridrate	80 g

ANNEX II - ANALYSIS OF INGREDIENTS

Microbiological Analysis	Udders (cow)	Tallow	Liver (cattle)	Meat (cattle)	Lung (swine)	Fat-free soya meal 44%	Rice Grits
Total Plate Count (UFC/g)	2.6×10^7	2.0×10^8	2.3×10^5	1.1×10^6	1.2×10^7	4.2×10^6	3.0×10^6
D - Group Streptococci (UFC/g)	1.9×10^4	$<10^3$	2.1×10^4	10^3	4.6×10^4	1.5×10^3	10^2
Coliforms	$+ 10^2$ $- 10^3$	$+ 10^3$ $- 10^4$	$+ 10^3$ $- 10^4$	$+ 10^3$ $- 10^4$	$+ 10$ $- 10^2$	$+ 10^2$ $- 10^3$	$+ 10^3$ $- 10^4$
Faecal Coliforms	$+ 10^2$ $- 10^3$	$+ 10^2$ $- 10^3$	$+ 10$ $- 10^2$	$+ 10$ $- 10^2$	$+ 10$ $- 10^2$	$+ 1$ $- 10$	$+ 1$ $- 10$
Staphylococci	$+ 10^2$ $- 10^3$	- 1	$+ 1$ $- 10$	$+ 10$ $- 10^2$	$+ 1$ $- 10$	- 1	- 1
Sulfite reducing Clostridium spores	$+ 10$ $- 10^2$	$+ 1$ $- 10$	$+ 1$ $- 10$	$+ 10$ $- 10^2$	$+ 1$ $- 10$	$+ 1$ $- 10$	$+ 1$ $- 10$
Mould	-	-	-	-	-	3.6×10^2	2.3×10^2
Yeast	-	-	-	-	-	3.5×10^2	1.4×10^3
Salmonellae 25 g	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Chemical Analysis							
Weight loss at 105°C (%)	73.7	0.5	70.0	66.7	77.2	12.47	11.37
Crude Protein (%)	10.73	-	20.9	20.1	18.6	44.47	6.85
Ether Extract (%)	14.2	99.5	5.0	12.0	2.9	2.19	0.35
Total Ash (%)	1.5	-	1.6	1.03	1.24	5.94	0.42
Carbohydrates (%)	0.36	-	1.8	0.4	0.3	34.93	81.01
Crude Fibre (%)	26.3	99.5	30.0	33.3	22.8	87.53	88.63

ANNEX III - MICROBIOLOGICAL ANALYSIS - EXPERIENCE I

MONTH	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Total Plate Count (UFC/g)	2.5×10^3	9.0×10^3	4.0×10^3	6.2×10^3	8.0×10^3	5.5×10^3	7.2×10^3	10^3	8.6×10^3	9.1×10^3	1.1×10^4	1.7×10^4
D - Group Streptococci	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Coliforms	< 1	< 1	< 1	< 1	< 1	< 1	< 1	+ 1 - 10	< 1	+ 1 - 10	+ 1 - 10	+ 1 - 10
Faecal Coliforms	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Staphylococci	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Sulfite reducing Clostridium spores	< 1	< 1	< 1	< 1	+ 1 - 10	+ 1 - 10	< 1	+ 1 - 10	< 1	+ 1 - 10	+ 1 - 10	+ 1 - 10
Salmonellae 25 g	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

ANNEX IV - CHEMICAL ANALYSIS - EXPERIENCE I

MONTH	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Weight loss at 105°C (%)	36.43	36.39	36.17	36.40	36.85	36.57	37.05	36.68	36.35	37.15	37.00	36.05
Crude Protein (%)	21.54	21.87	21.92	21.67	21.74	21.63	21.90	21.68	21.57	22.57	21.49	22.00
Ether Extract (%)	12.70	12.63	12.80	12.86	12.67	12.78	12.59	12.86	13.00	12.58	12.80	12.76
Total Ash (%)	5.60	5.54	5.35	5.71	5.66	5.47	5.61	5.58	5.90	5.59	5.37	5.74
Carbohydrates (%)	23.73	23.57	23.76	23.36	23.08	23.55	22.95	23.20	23.18	22.11	23.34	23.45
Crude Fibre (%)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Chlorides (%)	0.46	0.48	0.44	0.46	0.47	0.50	0.47	0.53	0.49	0.50	0.39	0.45
Nitrites (mg $NaNO_3$/kg)	44.95	45.00	44.87	44.89	34.96	12.91	12.73	10.21	13.72	12.96	7.61	4.67
TBA (*)	0.78	0.56	0.91	1.03	1.00	1.22	2.67	3.09	2.26	3.22	3.91	3.76
Peroxide Value (**)	Neg.	Neg.	Neg.	Neg.	Neg.	1.06	1.09	2.10	2.87	4.51	5.94	6.62
aW 25°C	0.88	0.87	0.88	0.86	0.88	0.89	0.87	0.89	0.88	0.87	0.87	0.89
pH	5.80	5.80	5.90	5.70	5.80	5.60	5.75	5.80	5.80	5.70	5.80	5.90
Metabolizable Energy (kcal/kg)	2659	2659	2681	2686	2640	2662	2634	2658	2666	2628	2651	2670

* mg malonic aldehyde/kg
** mEq O/kg fat