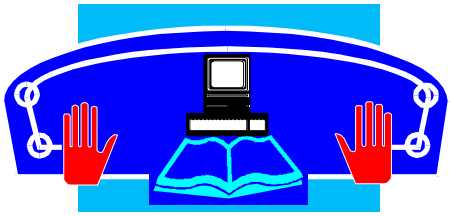

Final Report And Phase Iv Report Os Seal Meat Processing
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FINAL REPORT AND PHASE IV REPORT OS
SEAL MEAT PROCESSING

2-2-28 Arctic Foods
Analysis/Review

ENCE SYSTEMS

Search and Development

28 Maraboo Court, Brampton, Ontario, Canada L6Z 1B4 (416) 840-1267

SCIENCE SYSTEMS

Research and Development

Sam Ransom
Director Natural Resources
Box 1320
Government of the N.W. T.
Yellowknife.
North West Territories

March 30, 1989

Dear Sam

Attached is the final report as well as the Phase IV report. The original contract called for some 10 recipes for seal products. We became extremely interested in this project and developed far in excess of the what we had been contracted for, so the additional recipes have been included.

A few products were developed that were absolutely terrible so they were not included.

We were very pleased to be issued this contract and feel that many of the formulations included could form the basis of a successful business in the North. Some of the products were designed such that they could be made with minimal capital equipment.

We have included a letter of interest from First Air in the Appendix. Copies as well of some of the articles written on the products are included in the appendix.

Both the Explorer and Yellowknife hotels as well as the Frobisher Inn expressed interest in having some of these seal products on their menu's.

If there is anything that I can do to further assist the North in the development of its seal resource or other resources I am very interested. As a southern scientist and technologist, with the accepted limitations of that position, the resources of Northern Canada and some of their potential market and employment seem to have very good potential.

I trust that this report is what was hoped for when the contract was issued. I have tried to include as much information and explanation as possible such that the report can be useful. If however there is any aspects which you need clarified please feel free to contact me.

This final report was delayed as it was more difficult than expected to obtain the seals from a fall hunt and the lab took quite a while to produce results. With the pesticide problems in the Northern foods the lab was asked to check and re-check the results to be very, very certain that they were as exact as possible.

I congratulate you on your new position and present you with our report.

Yours truly.

David Ladd P.Ag.

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SCIENCE SYSTEMS
Research and Development

Final Report and Phase IV report of Seal Meat Processing.

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SCIENCE SYSTEMS

Research and Development

Final Report and Phase TV report of Seal Meat Processing.

Introduction

This is the final report on the seal meat project. Phase IV has taken longer than was originally anticipated for the following reasons.

1. It was more difficult than expected to obtain seal meat for this phase.
2. With the reports on pesticide levels in seal and related meats in the Arctic, the lab was instructed to be very, very certain about the results that they produced. The result is that they took quite a while to produce results.
3. Some of the final tests that were to be run required the results of these lab tests before the report could be finished.
4. Some of the formulations had to be restructured based upon the results of the presentations in Yellowknife and Iqaluit. These again needed the results of the lab tests to complete.

The following report is a report on our findings. When this project started a literature search was conducted that produced little if any good information an the procedures and practices required for the commercial utilization of seal meat. The information that did exist was related to utilization as animal feeds or home recipes for seal meat. The intent of our work was to produce the background information and proof that seal meat could be used in what is called “Value Added Processing”. The goal was to take seal meat and utilize its characteristics to the most benefit possible and produce food that is acceptable to a wide range of tastes. The wider the range of acceptance the higher the potential value of the product.

The products were presented in Two Hotels in Yellowknife and Iqaluit both hotels as well as others indicated that they would accept the products to be put them on their menu. This reaction was found not only with restaurants in the North but with one that was presented with product in the Toronto area as well.

This indication of interest of putting a product on a menu was a primary . acid test of the products. Hotels and restaurants have a wide variety of products to chose from for their menu. Very rarely is someone asked if a product can be put on a menu. It usually takes an intense sales presentation and luck to have products put on a menu.

In the following report observations and comments are presented. Where applicable background information is presented such that the reader is in a better position to understand the terms and procedures used for processing.

Science Systems Research & Development is pleased to present this report regarding the processing of seal meat. If we can be of any further assistance in the future in the development of this Northern resource we would be very pleased to be involved.

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The Processing of Seal Meat.

Seal meat is distinctly different than any other type meat that is used in meat processing. This is evident by the differences in proximate analysis in the attached tables.

There are structural differences in the meat as well as chemical differences. In examining the potential of seal meat it is important to account for the characteristics of seal meat in the formulations and processing techniques. Many interesting aspects were discovered regarding seal meat.

1. Spices

They do not react in the same manner with seal as they do with other meats. Many spices change their flavour dramatically, others seem to require a higher level of use to even be detected. This phenomena is quite interesting with spices such as garlic. If garlic is used in to high a percentage it can impart a bitterness. With seal meat one can often add garlic to a level well beyond what would be acceptable to even garlic lovers yet still have only a hint of garlic taste.

Unfortunately not all spices react in this manner. The result being that regular spice mixes that would be used on standard meats had to be dramatically adjusted. This caused a great deal of problems with pepperoni type products as the garlic was substantially muted whereas the hot pepper in the mix was more intense than it would be in regular meats.

Various spices of food processing products were used. One that was found to impart very pleasant flavours to seal and reacted very well with the characteristics of seal was H.V.P. (Hydrolyzed Vegetable Protein). The addition of H.V.P. brings out the meaty taste of the seal and seems to either cover or discourage the fishy taste. There are different types of H.V.P. each providing noticeable but not significant different results. The preference of which would be mostly personal taste, each one tried was acceptable. This product is not generally available in a retail situation and would require a processor or subsequent researcher to contact a ingredient or spice supply house.

Enough work was done on some of these selected products to know what can be expected and how to deal with them. The mixes were worked with enough to state that the majour problems were solved and that top class products are definitely possible with seal meat.

In this report the formulations and recipes will be presented for a variety of successful products that were made. As was described in the report at the end of Phase III many of the products made were either developmental towards other products or were generally unacceptable for a variety of reasons.

2. Processing temperature.

Temperature of processing is more important with seal meat than with most other meats. It is assumed that because of the unsaturated fats in the meat that high temperature cooking alters the fat structure resulting in oxidation of the fats. This high temperature results in a fishy taste in the meat. It is recommended that when processing seal meat it would be preferable to use a lower temperature for a longer time rather than higher temperatures over shorter times whenever cooking of the product is required.

In fermented products where the meat remains in an uncooked state the results were often favorable to a similar cooked product. Enough work was done with fermented seal meat products to state that this area of meat processing holds definite possibilities with seal meat.

It is assumed that the readers of this report do not have a in-depth knowledge of meat processing so explanations of procedures and equipment will be provided such that the processing and procedures can be followed and better understood.

3. Shelf Life Results

Although shelf life tests of the products was not called for in the contract, they were done as we had the products and it was felt that this information was important.

In general the products had a longer life than expected. The processed meats were expected to have a refrigerated life of four to six weeks. Although there was a minor taste change after six weeks the product was still very acceptable up to eight weeks after manufacture. This was further extended by freezing the product. Freezing however did cause some water loss as a result off ice crystal formation.

The meat pies were expected to have a frozen shelf life of approximately two months. They were still acceptable for consumption after seven months although they had developed a noticeable characteristic seal taste an were not as acceptable as in the beginning. They did however hold their manufactured taste and their original acceptability for almost four months.

The most surprising product in its ability to hold its quality was the seal liver pate and the liverwurst. Although it did loose quality and some of its flavour over time. It was tested after almost three months with just refrigeration. The bacterial quality was still within the range of acceptability and taste was still acceptable. This longer than expected quality of the liver products could very well be a result of the fact that it started out at such a high level of acceptance. This meant that even when it lost 30% of its flavour it was still better than most other liver products that would be made from chicken, pork or goose livers.

In general the shelf life of the seal products was in excess of what was expected and marginally better than could be expected from standard meat products.

4. Terms & References.

Terms & references and equipment that is mentioned in the recipes and discussion in order that the reader has a better understanding of this report. Definitions or explanations are offered here for those not accustomed to the meat processing business.

1. Kidney plate - denotes the size of the holes in a grinding face plate. it is a full plate separated into three sectors that each have a kidney shape.

2. 3 mm plate – denotes the size of the holes in the grinding face plate.

3. Ham Pickle - Pickle is the term used for the salt and spice mix that has been mixed with water and is used with the meat.
The word brine can sometimes be used interchangeably with pickle. Brine is often however the water salt and spices in which a piece of meat is soaked for a period of time.

4. Silent cutter - A silent cutter is a piece of equipment that is used to make many different types of meat products. It would be a standard piece of equipment in any meat processing facility. It is round with a donut shape, a series of rotating blades cut the meat and mix the product.

5. Vacuum tumbler – A tumbler is used to tumble the meat such that it rubs against the walls and other pieces of meat. This is used to bring proteins to the surface such that the pieces of meat will stick together. it also aids in the uptake of the pickle. When this is done in a vacuum the process is speeded up dramatically. The full meat science reasons for vacuum tumbling is beyond this report.

6. Tacky – A term to denote the change in the surface of the meat. If it is tacky it denotes that it will stick together in a reconstituted product.

7. Rest period - This allows the meat to fully absorb the pickle it has " picked up and follow through with the changes that have been initiated as a result of tumbling.

8. Stuffed - A term used meaning putting the meat product into a casing This is done with a stuffer. There are a variety of stuffers on the market. There are hand stuffers that work with a hand crank. There are also power stuffers that work either by gears or hydraulic. The sizes of stuffer used depends upon the size of the operation. There is an acquired art of stuffing casings. Overstuffing can burst a casing and understuffing will produce a undesirable product. It is an art that is best learned from someone that knows what they are doing.

9. Casing - A tube into which meat products are stuffed. Depending upon what type of product is made different types of casings are used. Some are moisture proof others allow moisture to pass through them. Casing used to be made from the intestine and various sections of animals. Today they are generally synthetic or manufactured out of edible products. There is a great variety of casings available. The are sized in caliber, English or metric measurements. When looking at achieving a certain product the casing can be very important. In the cooked ham type products that were made the product had to be cooled in cold water in order that the casing did not split. Others must be left in warm water, while others are air cooled.

Analysis and testing of Winter Seals plus Comparisons with Spring Seal.

Differences Between Spring Seal and Winter Seal.

Various areas of differences were investigated.
1. Proximate analysis
2. Fatty Acid Profiles.
3. Metals and minerals of winter seal.
4. Pesticides in seal blubber.
5. Body Structure in regards to occurrence of fat in the animal.
6. Taste and tenderness - Raw and cooked
7. Effects of cooking.
8. General overview of the differences between spring and winter seals.

Copies of the lab reports are attached at the end of the report in the appendix.

1. Proximate analysis.

Proximate Analysis of Seal Meat Spring and Winter Seal Meat.

Samples taken from centre of loin area, all surface fat removed.

	Spring Seal Meat	Winter Seal Meat
Ash	1.2 z	3.9 %
Calories	111.0 kcal/100gm	
Lipid (Fat)	.2 %	<.1 %
Moisture	71.2 %	68.9 %
pH	5.76 %	
Protein	27.4 %	27.1 %
Carbohydrates	.0 %	

Comparison of Other Lean Muscle Tissue to Seal Meat.

	Composition (%)			
Species	Water	Protein	Lipid	Ash
Beef	70-73	20-22	4-8	1
Pork	68-70	19-20	9-11	1.4
Chicken	73.7	20-23	4.7	1
Lamb	73	20	5-6	1.6
Cod	81.2	17.6	0.3	1.2
Salmon	64	20-22	13-25	1.3
Seal Meat (spring)	71.2	27.4	0.2	1.2
Seal Meat	68.9	27.1	<1	3.9

2. Fatty Acid Profiles.

Fatty Acid Analysis of Spring and Winter oil from seals.

Spring seal tests were conducted in Phase III. In Phase IV more work was done on the oil by fractionating it into high and low melting points. In addition a raw seal oil test was done on a winter seal. The last column is an average of the tests.

Fatty Acid FA in mg/gm	Spring Seal	Fall Seal			Winter Seal	Average
		Raw Oil	High Melting point	Low Melting point		
16:0	1.8	4.6	6.7	5.2	8.5	5.0
16:1n7	25.3	21.9	20.5	23.3	22.3	23.2
18:0	ND	.6	1.1	.7	1.2	.9
18:1n9	24.4	26.4	25.9	28.2	26.5	25.8
18:2n6	2.0	1.9	1.8	1.9	1.7	1.9
20:1	8.5	8.2	8.8	8.5	6.4	7.7
20:5n3 EPA	9.7	9.6	8.9	8.5	8.2	9.2
22:1	.7	.9	.9	.7	1.1	.9
22:5n3 DPA		6.5	6.2	5.2	5.0	5.8
22:6n3 DHA	7.6	10.5	9.9	8.2	9.5	9.2
Total fatty acid in mg/gm		835.0	862.0	730.0	828.0	

Other Specs. Regarding Seal Oil.

Weight vs Volume – One liter of oil weights 865 gm. or .865 Kg.
– One Kilo = 1.156 liters.

Energy – 100 gm. = 900 kcal.

Cholesterol - 73.0 mg/100 gm.

Bacterial Plate counts were done on the oil after storage for a few months and the results indicate that bacterial growth did not occur.

Bacterial Test results Nov.9,88 after two months of storage.

Total Plate count <lo
Confirmed coliforms <10
E.Coli <lo

3. Metals and minerals of winter seal.

Winter Seal Meat Metal analysis in ppm.

Arsenic	.04	ppm.
Mercury	.31	ppm.
Molybdenum	< 2.0	ppm.
Zinc	26	ppm.
Phosphorus	<1000	ppm.
Lead	< 4	ppm.
Bismuth	< 4	ppm.
Cadmium	< 1	ppm.
Cobalt	< 2	ppm.
Nickel	2	ppm.
Barium	< 20	ppm.
Iron	200	ppm.
Manganese	< 2	ppm.
Chromium	3	ppm.
Magnesium	< 200	ppm.
Vanadium	< 2	ppm.
Aluminum	< 200	ppm.
Beryllium	< 1	ppm.
Calcium	< 200	ppm.
Copper	< 2	ppm.
Silver	< 1	ppm.
Titanium	< 200	ppm.
Strontium	< 2	ppm.
Sodium	400	ppm.
Potassium	4400	ppm.

4. Pesticides in seal blubber.

Pesticide Screening of Winter Seal. Oil.

Organochlorine compounds

alpha-BHC		.153 ppm.
beta-BHC	<	.04 ppm.
gamma-BHC	<	.02 ppm.
delta-BHC	<	.02 ppm.
Heptachlor	<	.02 ppm.
Aldrin	<	.02 ppm.
Oxychlorodane		.315 ppm.
Endosulfan I	<	.02 ppm.
Endosulfan II	<	.02 ppm.
p,p'-DDE		.558 ppm.
p,p'-DDD	<	.02 ppm.
p,p'-DDT	<	.03 ppm.
Methoxychlor	<	.03 ppm.
HCB	<	.02 ppm.
Dursban	<	.02 ppm.
Heptachlor epoxide	<	.02 ppm.
gamma-Chlordane	<	.02 ppm.
alpha-Chlordane	<	.02 ppm.
Dieldrin	<	.02 ppm.
Endrin	<	.02 ppm.
Ethion	<	.02 ppm.
Ronnel	<	.02 ppm.
Mirex	<	.02 ppm.
PCB as Archlor 1260 channel 1		.920 ppm.
PCB as Archlor 1260 channel 2		1.400 ppm.
PCB mean average		1.160 ppm.

Pesticide Screening of Spring Seal Oil.

These tests were done as a cross check to the original tests done in Phase III. The results were lower than the first Lab. The procedures were found to be better in the second lab and the confidence is higher with this lab.

Only pesticides detected all others in list above were below detection limits. PCB's were not tested in this trial.

alpha-BHC	.03 ppm.
Mirex	.03 ppm.

All other Organo-Phosphate pesticides	None detected

5. Body Structure in regards to occurrence of fat in the animal.

There was a definite difference between the positioning of the fat in a spring seal as compared to winter seal. This phenomena was expected as the feeding habits are different previous to these periods.

In the spring seal there was an absence of what is called brown fat. This is the fat that is stored on the surface of the meat between longer term storage fat and the meat. The brown fat in an animal is the fat that is in position and condition for ready use by the animal. The spring seals did not have the evidence on any significant brown fat or other fat between the muscle groups.

The winter seal however had significant brown fat. The heaviest concentration was between the muscle layer that was next to the blubber and the rest of the body meat. The highest concentrations were on the sides of the body and in the front flipper sections. There was also brown fat and other fat storage between the muscle groups in the front flippers and chest muscles.

The loin muscle however did not show any noticeable fat build up and was not significantly different from spring seal loin.

The fat in the meat sections of the seal was in between the muscle groups and was not within the muscles structures themselves.

We found that it is the fat that generally produced the fishy tastes when the meat was prepared. This means that if a seal was harvested with a higher fat content, such as the winter has between the muscle groups, then the butchery and cutting of the meat would be more involved.

The loins did not seem to vary very much as this muscle is mostly one main muscle. It would be expected that the loin meat from a winter or spring seal could both be used in the same types of products.

The meat itself was almost structurally the same in texture in the raw state however it did show some differences when cooked. That will be covered in a later section.

The main difference in the seals from these two seasons was the presence of the brown fat in between the muscle groups. There were some differences that could be partially explained by the difference in moisture of the meat.

6. Taste and tenderness - Raw and cooked

The taste of a spring seal as compared to a winter seal was different. In the raw state the winter seal had a stronger characteristic seal taste. The stronger taste was not in the falvour profile of fish by in the meat taste of the seal.

It was not an unpleasant taste but the difference was present. The difference was significant enough that for certain products it might dictate a small change in certain spice mixes for some products in order to maintain a consistent product flavour profile.

The tenderness of the meat did not seem to vary between a spring and winter seal.

The taste of the meat after cooking was a more significant difference than the taste in the raw state. Once cooked the winter seal meat had a stronger seal taste that could be best characterized as a pleasant but mild musty taste that was not as apparent in a spring seal.

In general the winter seal products were acceptable in the raw and cooked state. The spring seal however produced a product that was more acceptable to the palate unaccustomed to the characteristic seal taste.

It would be a recommendation that if seal was considered to be used as restaurant food then a spring seal might be more acceptable to the visitor than a winter seal.

7. Effects of cooking.

Spring seal meat and winter seal meat was cooked and prepared together in the same conditions. The spring seal shrunk upon cooking and distorted as one would expect any regular steak to react. The winter seal however did not react in the same manner. It did not shrink in the same manner and basically kept its original form. Identical cuts from the same muscle group were used from spring and winter seals. This reaction to cooking is best explained by the difference in moisture in the meat.

The tenderness and taste of the spring seal was more acceptable than the winter seal. Seal meat is quite tender to begin with and indications that the spring seal was mildly more tender than the winter is not to indicate that the winter seal was not tender. Both the seal samples were more tender than most beef cuts of meat.

The ability of the seal to react to spices was not noticeably different between spring and winter seals. The amount of certain spices however might be mildly different in order to make them both taste the same.

8. General overview of the differences between spring and winter seals.

When considering seal meat as a potential commercial meat to be used for prepared meat products the following recommendations could be considered.

There are differences that exist between spring and winter seal meat. Although the may require different procedures they are not problematic.

It is recommended that products using loin meat could be kept relatively constant with meat from any season. Certain other processed meats such as restructured ham type products would not show any significant differences as long as the brown fat was removed from the winter seal before processing.

Other products such as meat pies would need to have a minor formulation changes in order to keep a consistent product. These changes would become evident to any chef that was working with the meat. Minor changes such as increases in the lemon used in preparation. Minor changes in the H.V.P. used etc.

In general if one were to make a decision that the seals from one season or another were to used in processing it is recommended that it would be easier from a butchery point and processing point to work with spring seals.

The taste differences that exist are significant only to the fact that the winter seal has a stronger seal taste. To the palate that enjoys that taste of seal, the winter seal may preferable.

As the researcher who has had the occasion to consume seal meat in wide variety of forms, mixes, preparations and formulations the winter seal meat is quite acceptable but the preference is towards spring seal meat.

Recipes and Formulations for Seal Meat and Related Products.

In some of the recipes will be noticed a (*) with a number this relates to the terms and references on pages 4 and 5 of the front part of this report.

The recipes have been presented so that they can be understood and used. Some of them require a professionals background knowledge of meat processing or cooking.

The Recipes incuded are:

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1. Reconstituted Seal Ham (with soy isolates)

Material: 7 Kg. Seal Meat pre-ground through Kidney plate(* 1).
(Loin and larger muscle meat was used)
1 Kg. Seal Meat pre-ground through 3 mm plate.(* 2)
(Rib trim and smaller pieces were used)
2.0 Kg. Ham Pickle (35%) (*3)
10.0 Kg. Product.

Ham Pickle:
500 gm. Hela Brine & Cure.
20 gm. Hela California Ham Spice.
240 gm. Hela Soy Isolate.
1,240 gm. Water.
2,000 gm. Ham Pickle.

Processing:

The Ham Pickle was made in a silent cutter (* 4) at high speed for approximately 2 minutes.
All of the meat was put into a vacuum tumbler (* 5) and then the pickle added to the meat. The tumbling process was done in two steps.

A) Tumbling for 2.5 hours at full speed under vacuum (Approx. 25 rpm.)
The meat was very tacky (* 6)afterwards.
The meat was then given a rest period(* 7) for approx. 12 hours in a refrigerated environment approx. 4°C
B) The meat was tumbled again for 1.5 hours at full speed.
After the second tumbling the meat was very tacky and dry.

The meat was then stuffed (* 8) into moisture proof coated casings (* 9) "Teepack". of a caliber 90.
It was then cooked in a water bath at 73°C to an internal temperature of 70°C.

The product was water cooled immediately for approximately 1.5 hours at a water temperature of approx 15 -18°C. It was then placed in a cooler at 2–4°C. The product was firm with no juice nor water loss.

The water cooling after cooking is important so that the casings do not break after cooking. It is important to lower the temperature by this manner when cooking this type of product.

Reconstituted Seal Ham (with soy isolates) (cent'd)

General observations:

The product had an acceptable taste and a shelf life of about 1.5 months in a cooler. It was found however that the soy isolates did provide a minor background taste of soy and should only be added if a lower price product is desired.

The samples were then frozen to extend their shelf life. It was found that the product froze well and was still acceptable after thawing. There was a little water separation after thawing that was evident in the casing. This however did not dramatically effect the meat. There was as would be expected a little water evident in the meat but it was no worse than one would find in a square loaf ham. There was a slight taste change in that some of the fresh taste was no longer evident however this did not detract from the product and was not noticed by those who tasted the product for the first time.

The structure was acceptable in that it held processing water at an acceptable level. Juiciness was acceptable, the sugar content was a little high and could be lowered. The flavour held reasonably well over two months. While in its casing the microbiological quality of the product stayed acceptable. Once exposed to air the shelf life shortened dramatically, as quickly as regular cold cuts. As a cold cut item for sandwiches it was acceptable.

2. Reconstituted Seal Ham (without soy isolates)

Material: 7 Kg. Seal Meat pre–ground through Kidney plate.
(Loin meat and larger muscle meat were used)
1 Kg. Seal Meat pre–ground through 3 mm plate.
(Trim and smaller pieces used)
2.4 Kg. Ham Pickle (30%)
10.4 Kg. Total weight of product.

Ham Pickle:
400 gm. Hela Brine & Cure.
20 gm. Hela California Ham Spice.
1,980 gm. Water.
2,400 gm. Ham Pickle.

Processing:

The processing procedure was identical to the reconstituted seal ham with soy isolates.

This mix did however produce different results.
Immediately after the-cooking process, some juice could be felt at the ends of the casings. This juice remained in the casing over the period of the refrigerated storage of the product.

This occurred even though at the end of the tumbling the meat felt dry and tacky before being put in the casing. This juice was obviously a result of not using the soy isolates.

The product produced in this manner had better basic flavour than the one with the isolates. The juice in the casing would be unacceptable under general processing. This could be solved by a few different methods.

1. The product be removed from the casing before sale and the juice discarded (not preferable as once the casing is removed the shelf life" will be shortened.
2. Perhaps an extension of the tumbling time at temperatures not exceeding 4–5°C. with a 30–40% added brine.

In order to develop a procedure not using soy isolates more work and tests would need to be conducted to find the most suitable technology.
It would be suggested that less processing water could be used thereby lessening the free juice in the casing.

'General Observations.

By using the mix that would be used with a ham the flavour was acceptable but it is recommended that a brine containing less sugar be used. The meat by itself develops a sweet taste and the addition of sugar does not always enhance the flavour. The actual brine used requires some adaptation for use with seal meat. In this product it is a minor aspect and will greatly depend upon the taste preferences of the consumer group consuming the product.

The product froze well and was acceptable after thawing. The observations after thawing were the same as the ham with the isolates.

3. Reconstituted Seal Pastrami.

Material: 7 Kg. Seal meat pre-ground through kidney plate.
1 Kg. Seal meat pre-ground through 3 mm plate.

Pickle: 500 gm Hela Brine & Cure
40 gm Hela Liquid Pastrami Seasoning
360 gm Hela Soy Isolates
3,100 gm Water

Processing:

The pickle was made in a silent cutter at high speed for approximately 2 minutes. All of the meat was put into a vacuum tumbler and then the pickle added to the meat. The tumbling process was done in two steps.

The meat was then stuffed into moisture proof coated casings "Teepack" of a caliber 90. It was then cooked in a water bath at 73°C to an internal temperature of 70°C.

The product was water cooled immediately for approximately 1.5 hours at a water temperature of approx 15 -18°C. It was then placed in a cooler at 2-4"C. The product was firm with no juice nor water loss.

General observations:

The pastrami was firm and provided a good pastrami taste. The spices could have been a little more, but that would be a function of taste. The product held its texture over time and while in the casing had an acceptable shelf life. The flavour was decreased over time. If the product was to be kept for a while in storage before marketing, it is recommended that the amount of pastrami spice be increased.

The shelf life and freezing observations were the same as the Ham type products.

4. Cured and Smoked Seal Loin (or other large muscle meat)

Material: 5 kg. Large pieces of seal meat
the loin being most acceptable.

Pickle: 500 gm Hela Brine & Cure unit
20 gm Hela California Spice
980 gm Water

NOTE: A variety of pickle formulations are possible. There are hundreds of types of formulations in present use for meats. This one was one of many tried and is the simplest of the ones used as the spice mix comes premixed.

The pickling or curing of meat is a combination of science and art. The science can be explained but the art needs to be learned and is almost impossible to describe without writing a book and even the books leave out much of the real art.

Processing:

The pickle was dissolved in the silent cutter for 2 min. at high speed. The whole pieces were put into a vacuum tumbler and the brine. Tumbling was done in two segments.
1. Two hours
2. 24 hour rest for meat
3. Two hours tumbling

After tumbling the hams were smoked un–netted.

General observations:

The ham pickle although providing an interesting flavour to the meat seems to fight the natural flavour of the meat. Seal is not pork and this product seem, to again show that the spice mixes should be specific to seal rather than using off the shelf mixes. The product was acceptable from a. taste point. Smoke seems to complement the seal taste quite well.

The product was smoked in an un-netted form to give it a wild game type look . This seemed like a good idea at the time and did produce a wild game type look, however the smoking flavour varied in the product as the thicknesses varied to much. In the future it is recommended that the product be netted. Latter products were netted and provided much more even cooking results. Un-netted product might be acceptable for specific market or presentations. The wastage is also more on un–netted products. The product dried out quite quickly and did not maintain an acceptable flavour for very long.

It was also discovered as a result of this product and a later produced smoked loin, that pumping of the meat produces a more succulent product than just tumbling. It is also recommended that unless the product is being made to highlight the wild game look then the product be netted.

Netting the product results in a better overall product with more even smoke penetration and less drying of the product. It is also recommended that the finished product be vacuum packed while still warm from the smoke house. This type of product has experienced a shelf life of in excess of 6 months in a non frozen but refrigerated condition.

With a product as involved as this type of product in which smoking procedures etc are included it is beyond the capacity of a written recipe. It requires training of the processor and a good background knowledge of meat processing.

This type of product has very much potential with seal and related Northern game meats. If there are persons interested in pursuing this type of product manufacture in the North it was arranged that they could come down and learn the basic art from small processors. Science Systems arranged possible with some small local tradesmen the possibility of providing training.

5. Smoked Seal Ribs.

Material: Seal ribs after the rim trim was removed. The meat was left between the ribs.
Cover Pickle

Pickle: 40 gm Hela Brine & Cure Unit
2000 gm Water
3 gm Hela Liquid Pastrami Seasoning.

Processing:

Some of the ribs were soaked in the brine for 24 hours and others were soaked for 48 hours. They were then smoked.

General observations:

The ribs were smoked in order to develop a product that would use the ribs. The ones soaked for 24 hours were preferable to those soaked for 48 hours. (The 48 hour soak was saltier).

This product is interesting and does have some application. The pastrami spice used in the cover pickle could be changed as the smoke flavour mixed with the pastrami flavour in addition to the seal taste could have been a little better. The product was liked by a few people and had a definitely different taste.

The product was kept under refrigeration and dried out with storage. This drying out produced a product a little more like a smoked jerky.

It is felt that the removal of the meat from between the ribs to make jerky strips may be a better end use for the rib meat. A variety of methods were tried to present the ribs including a honey, lemon and garlic glaze. This was interesting but was not well received by the taste panel.

For use in production the meat structure from between the ribs is quite . different than the rest of the seal and lends itself well to jerky type products, be that jerky on the rib itself or removed form the bone.

Like most of the products that were made in a standard brine they came out much saltier than was expected. The meat seems to take in more salt than other types of meat in the same brine.

6. Seal & Caribou Cooked Salami

Material:
- 4 Kg. Caribou lean] Basic
- 1 Kg. Ice] Emulsion
- 2 Kg. Caribou fat
- 2 Kg. Seal meat 3 mm ground

Ingredients:
- 225 gm Hela Nitrite Cure
- 65 gm Hela Bierwurst Spice
- 20 gm Brilliant Red
- 45 gm Helabin X

Processing:

The caribou meat was cut together with all of the ice and spices in the silent cutter to a temperature of +4°C.

The fat was added, cut to granulation and finally the pre–ground seal meat was mixed under. The product was then stuffed into Naturin 47 mm casings (Collagen coils) and smoked in a Reich Automatic smokehouse.

The product felt good in the cutter and had an excellent bind.

General observations:

Only sufficient caribou fat was obtained to make one product. The caribou fat is excellent to use with seal. Caribou fat is superior to beef fat and goes very well in processed products. Caribou and seal go together very well the flavours seem to complement each other.

In general the salami was a very acceptable product. It could have had more spice added, an increase of the Bierwurst spice from 65 gm to 100 gm is recommended. The product was good, the structure was excellent and the mouth feel did not have the tallow feel characteristic of beef fat.

The use of seal in conjunction with caribou and caribou fat were successful and it is recommended that it be used again in other formulations. It was received well by tasters.

The combination of caribou and seal provides a colour differentiation in the product that is quite pleasing to the eye.

During storage under refrigeration it was dried, producing a very firm and dry salami.

This product was accepted well by itself as well as on pizza.

A good product and one that is recommended to be reproduced in later work.

7. Seal Pepperettes, Cooked.
8. Seal Pepperettes, Fermented.

This product was worked with quite a bit as it was a meat snack type food. Meat snack foods are the fastest growing sector of the meat market in North America. In addition there seemed to be an expanding market for these types of meat snacks as well in the N.W.T. Some of these meat snack type foods do not require large capital investment and can be made in smaller facilities.

A variety of formulations will be presented so that the reader will appreciate the variances that can be achieved.

There are two main types of pepperette type products that can be made.
1. A cooked type product. 2. A fermented type product.

Both of these types of pepperettes will be covered in this section
It is important to state as well that the term pepperette is used in a broad sense. There are other similar products with different names These other similar products are made in the same manner with differences being in the spice mixes. A pepperette is specifically a small diameter type cooked or fermented meat product with a pepperoni type spice mix used. There are other similar products with salami or other basic spice mixes. For simplicity these variances will all be referred to as pepperettes,

Two main types Cooked and Fermented.

Both of these types of products begin with raw ground meat to which spices have been added. In order to inhibit spoilage of the meat the meat can be cooked or fermented. One of the main differences is that a fermented product is not cooked.

Cooking denatures the protein and kills off the bacteria in the product after which the product can be partially dried and packaged. In addition there is often added a chemical to change the acidity of the product to further inhibit spoilage.

Fermentation is a process that adds a bacteria culture to the meat that is quite similar to the bacteria that is added to milk to make yogurt. The meat product is then kept in a humid and warm environment for a predetermined time until the acidity of the meat has changed and the proteins have changed in structure as well. The chemical changes as well as the change in the acidity of the meat inhibit the process of spoilage. This results in a product that does not require refrigeration and can have quite an extended shelf life at room temperatures.

This report is not a course in meat science however this background is important to appreciate the work and product lines that were examined with the seal meat.

A fermented product is generally accepted as being of higher value and preferable to a cooked product and requires a greater level of training and skill to manufacture. Many of the meat snacks presently being marketed are cooked, however they have chemicals added to them to simulate a fermented type product.

In the investigation of seal products a fermented type product was investigate for two main reasons.

1. It would provide a higher value product.

2. The chemical nature of seal indicated that cooking of the meat enhanced the oxidation of the unsaturated fatty acids in the meats resulting in a product that developed a fishy taste. It was hoped that by fermenting the meat heat could be avoided while lowering the pH resulting in a product that had a longer shelf life and one that inhibited the process of oxidation of fatty acids.

Background:

A variety of product runs were tried they will be listed below

Cooked pepperettes

Trial 1. 3 Kg. Seal meat 3 mm ground.
2 Kg. Beef Fat trim 3 mm ground.
(Acceptable product when hot or warm once cooled the beef fat produced a tallow mouth feel that was unacceptable)

Trial 2. 7 Kg. Seal meat 3 mm ground.
+ 3, +4 3 Kg. Pork Fat 3 mm ground.
(More acceptable product over longer term, tallow mouth feel not present, 30% pork fat produced a product a bit too much fat further trials lowered this fat content to 25% and again to 20%)

Fermented pepperettes.

Two trials were run on fermented pepperettes with 25% and 20% pork fat with a variety of different spice percentages.

The level of fat in the end product will depend upon the market. At 20% " +25% some people found it very acceptable while others found it a little fatty. It should be noted that those who had been used to eating the pepperettes that are on the market found the seal product to be less fatty and more acceptable than those purchased at retail. Those that had not been used to the commercial product found the seal product a little fatty.

It was general opinion that even if the tasters liked the commercial meat snacks that they often preferred the seal product. If they did not like the commercial pepperettes they either liked the seal pepperettes better than the commercial or did not like either.

A further note that is important is that although the average adult fell into various areas of preference, virtually all the young people that tried the product enjoyed it in preference to the commercial product. This was interesting as the market research on meat snacks indicates that the market is primarily a young market at present.

Ingredients:

Basic recipe that was used each trial varied this recipe to some extent.

125 gm Hela Nitrite Cure
75 gm Hela Hot Pepperoni Spice (increased by approx 20%)
10 gm Garlic Powder (This was varied with about 20 to 25 gm being the most acceptable.
50 gm Hela Soya Isolates
50 gm Hela Raukal CH Smoke Powder. (can increase by 10-20% if more smoke flavour desired.)
10 gm Brilliant Red

Processing:

All the preground materials were mixed together by hand and then stuffed into casings.

For the cooked product They were cooked in dry heat at 80°C for 1 hour to an internal temp. of 70°C.

For fermented product a culture was added plus a small amount of sugar. The product was then put into a fermentation chamber.

Additional spices that can be added are anise, lemon powder, black pepper onion powder(very careful with onion powder, as to much will cause a bitterness). Small amounts of bay leaf powder at levels below detection seem to give some benefit as well.

As can be seen by the variables that exist in the spice mix as well as the variables that exist with the seal meat this type of product can be fine tuned quite a bit.

Note: To put this product into perspective. The present products that are on the retail market took the meat companies involved months and months of work to develop. Initial response to our product gave us an acceptance level of about the same as is found with other meat snack products.

9. Liverwurst (without seal fat)
10. Liverwurst with seal fat)

These products were made the same manner except that one had seal fat added whereas the other didn't. Two different spice mixes were also tried.
Materials: 1,500 gm Seal Liver raw, slightly frozen.
350 gm Pork skin cooked, hot
400 gm Hot water
900 gm Seal trim, lean, cooked, hot.
1,850 gm Pork Fat cooked, hot

For the product with seal blubber 1.5 Kg pork fat was used and .5 Kg seal blubber.

Ingredients:
85 gm Hela Nitrite Cure
15 gm Helabin X
40 gm Hela Calfsliverwurst Seasoning fine.
or 40 gm Hela Liverwurst Homemade Style season
10 gm Onion powder
10 gm Sugar

Processing:

Raw seal liver was cut in the silent cutter together with the nitrite cure and Helabin X until it produced a good bind.
Liver was removed from the cuter and placed in the cooler.

The pork skin, pork fat, and seal trim were cooked for 25 min at 85°C and immediately put into cutter. The hot water, spices and precut liver that had been stored in the cooler were added. When the total mix was 32° to 35°C the finished emulsion was removed from the cutter bowl and put into Supralon PVDC moisture proof casings cal. 60 mm. The sausages cooked in a water bath at 74°C to an internal temp of 70°C. then air cooled.

In the processing of this product the temperatures of mixing are very " important, if not followed properly the emulsion will break down resulting in a poorly structured product.

Liverwurst (without seal fat), Liverwurst (with seal fat) (cent'd.)

General observations:

The flavoring was acceptable and the taste of each product was different. The sausage with the seal fat used a calfsliverwurst spice, whereas the spice in the second was Home Style Liverwurst Seasoning.

The seal fat product – A characteristic of liver is that it tolerates oils and fats very well and it was felt that if the seal fat went in any product it might go well in the liverwurst. Initially the seal fat product was acceptable however having a definite fishy taste as it aged, it developed a stronger fishy taste. The shelf life on the product with the seal fat was quite short it developed a fishy taste within a few days. The structure of the seal fat sausage was poor and it did not hold together as a liverwurst should .

The second product without the seal fat started out tasting quite good and kept its flavour very well over storage and freezing and thawing.
The flavour was accepted by those that tasted it and was well received. The structure was perfectly acceptable and it could be considered a successful product. The shelf life turned out to be longer than expected. It was quite acceptable 4 – 5 months after making the product.

The basic spice mix was very acceptable however it may take some fine tuning in some of the minor spices.

11. Fresh seal and pork sausage

For 5 Kg. Sausage.

Materials: 3.03 Kg. Seal meat ground 8 mm
1.01 Kg. Pork fat ground 8 mm
635 gm. Ice Water.
320 gm. Custom Spice from Rector spices.

Processing:

The fat and meat were ground separately then added together with the spices and ground again in a 3mm head.

The meat mix was then put into hand link sausage casings and frozen.

General observations:

The fresh seal sausage produced was an acceptable product, with a characteristic seal taste, with sufficient fat provided from the pork fat to provide a juicy feel. The product was cooked on a Bar–B–Que. Pieces were offered to approximately 100 people at a gathering. Out of those that tasted the product about 40% liked the product very much and were quite impressed; 30% liked the product and found it quite acceptable; 20% were glad they had tried the product but were not really impressed with the seal taste as it was new to them and felt that they would need to become accustomed to the taste; 10% found the product had a liver type taste.(Most of these people were "liver haters" and generally indicated that they did not like liver or anything that even remotely tasted of liver.)

It was interesting that everyone that was offered the sausage was told it was seal meat. Only two people mentioned their feelings regarding the killing of seals and Green Peace. It was also interesting that both of these people later tried the product and found it quite acceptable. Outside of these two people there was not any noticeable negative reaction to the fact that it was seal meat. This was surprising as a negative " reaction was expected from quite a few of the people.

Fresh seal sausage is a product that will take some more work to come up with the ideal spice mixes and ratios of fat, meat and water. From the present work done it indicates that a fresh seal sausage would be an acceptable product. It is believed that the basic seal taste is more conducive to a Bar-B-Que type product rather than a breakfast type product, however this may be different for different taste preferences.

The custom spice mix that was used had a little too much nutmeg oil in the mix. If this spice mix is desired by anyone they can contact Rector Foods Ltd. in Mississaga, Ontario and squire the spice mix.

Comments on the tests conducted and processing aspects of ringed seal meat. – by the sausage master.

Seal meat has very little in common with pork, beef or poultry meat. There is even substantial differences among the different species of seal, with respect to smell and taste of the meat.

The differences between seal meat and other types of meat are illustrated in the following chart.

Type of meat	Waterbinding Capacity	Fatbinding Capacity	Amount of Seasoning Needed
Seal meat	average	less than average to average	50 to 80% more than beef or pork
Beef Meat	Good – Very good	Good - Very good	average or a little above average
Pork Meat	Good	Good	Average
Poultry Meat	Good	Good	Less than average

Due to its very dark colour as well as the unsuitability of the seal fat in processed meats, meat and fat from another animals would be a good supplement and would definitely enhance the appearance and taste of various sausage type products.

12. Seal Meat and Kidney Pie.
13. Seal Meat and Vegetable Pie.
14. Seal Meat and Mushroom Pie.

Materials: Seal meat (upper chest and back meat, upper flipper meat to back flipper meat. Loin meat was found to be almost to tender once reheated and not as preferable as the previous meat sectors.)

For small batch.

2.00 Kg. Seal Meat cut 1/4 in. mesh
.5 Kg. Onion Cut 1/4 in. mesh
.5 Kg. Kidney or Mushrooms or vegetables.
.25 Kg. Butter
.25 Kg Bread flour
3.00 Kg Stock
.15 Kg Hydrolyzed Vegetable Protein
200 ml. Sherry (dry)
10 gm Caraway
20 gm Salt
10 gm. Black Pepper

Processing:

Blanch the seal meat in Fond, rinse and allowed it to dry off.
Fry onions in butter until glossy.
Add seal meat (Kidney if using kidney) and saute lightly.
Add flour, mix well and saute-5 minutes.
Add hot stock, vegetable protein, sherry and spices. Simmer for 20 min depending upon meat used. Less time for loin meat.
Cool in refrigerator then fill pie shells, and cover shells.
Bake in oven 350'F for 20 to 30 min. until golden brown.

The Pie Shells.

5 lbs. All Purpose Flour
3 lbs. Lard (Crumble)
2 oz. Salt.
(Various other spices can be added to the pie crust if desired)

Fond For Blanching Meat.

2 Gal. Water
2 Diced onions
1 oz Bay Leaves
1/2 oz Caraway Seeds
2 oz Whole Peppercorns
1 pt. Lemon Juice
1 lb. Rough diced carrots
1/2 lb rough diced celery.
2 oz salt.

(cent'd next page)

1. Mix all ingredients in cold water.
2. Simmer easy for at least 1 hour.
3. Let stand at least 12 to 15 hours.
4. Strain out solids.

Use this for.
1. Blanching of meat.
2. As a stock or ground juice for gravy.

The filling was placed in the pie shells, covered and frozen.

This product was developed after most of the previous products. The development of this procedure and recipe is the result of hours and hours of testing and re-testing using much of the taste testing and flavour profile information. Although this is as accurate a description as possible of the spices and procedure of preparing the seal meat pies it is recommended that this preparation is best done by a qualified chef. It does seem to require the artists touch to produce a high quality product.

The art aspects are how much to cook the filling considering that it will be recooked again in the pie shell. This is a function of the cut of the meat and the size of the pieces. In addition depending upon if one is making a Seal and kidney, mushroom or vegetable pie. The timing of the addition of the ingredients is also important.

This product as most of the other products was developed for commercial production and not for domestic production.

For presentation the pies are cooked in a regular or convection type oven.

General observations:

The meat pies were accepted by everyone that tried them. The meat and kidney pie had a definite kidney taste which was not as strong as a beef kidney taste, but still quite evident. Those that liked steak and kidney pie liked the kidney pies whereas those that did not like a kidney taste . gave it low preference.

The meat and mushroom pie was the most generally accepted pie. The basic flavour was definitely seal yet without a strong evidence of the fish or liver taste.

This product would be a very good value added product and should also receive definite consideration as a commercial product.

In the presentations in Yellowknife and Iqaluit this product was one of the most favoured by those present.

15. Galantine

Material:
1 Kg. Seal meat
3 Kg. Caribou
600 gm. Onions
600 gm. Bacon

Spices
35 gm. Oregano
35 gm. Marjoram
35 gm. Garlic
100 gm. Salt

Processing:

The seal meat was used in larger pieces whereas the caribou was finely ground to be the back up meat on the product.

The galantine was made in a loaf pan. The pan is lined with raw bacon. The meat mix is placed into the loaf pans and the ends of the bacon placed over top of the filling.
The loaf is then placed into the oven and cooked.
After being cooked it is removed and placed into a refrigerator to cool and harden. Once hardened it is removed from the pan and wrapped and frozen to be served sliced and cold.

Some of the procedures for this product are covered in the video that was presented at the end of phase III.

General observations:

The colour differentiation created by using the caribou and seal together were as expected and provided a good visual appearance. The flavour combination was acceptable and it is suggested that it be presented with a gelled cranberry sauce to give it a tartness.

16. Seal Meat Ravioli

Materials: The seal meat was preblanched in the same manner as for the meat pies in the fond.

The amount of seal meat is a function of how much product is desired. The spices are a mixture of oregano and Italian spice mix.

The basic procedure outlined for the preblanching of the meat as was done for the meat pies applies to many products. This is a precursor for the ravoli or other types of products.

Since the meat is quite dry and it does not hold together as required for a ravoli mix egg was added to the mix. Sufficient egg is added so that the meat would hold together in a small ball.

This same procedure is important if meat balls or other types of products are made.

Processing:

The meat mix was made dry and finely ground so that it would be usable in the ravoli equipment.

General observations:

The ravoli product was developed for a variety of reasons.

1. A product was wanted that appealed to children.
2. A product was wanted that could be a general product that could be related to by everyone and a pasta type dish is that type of product.
3. A product was wanted that offered some white colour to compliment the blackness of the meat.

Ravoli and that type of product are high value added products. The colour differences that exist between the white of the Ravoli and the darkness of the meat is quite interesting in this product.

The taste of the product is acceptable although some work might be done on the fine tuning of the spice mixes used in the meat. The meat was a little dry as there was not any fat in the meat just lean. The tomato sauce spicing could be adjusted little to account for the taste differences of the seal.

The making of this product for this contract had additional motives. Seal Ravoli and other pasta type products could be the basis of a separate processing facility that could service the Northern community. There is not any reason that additional pasta type products could not be made such as caribou, musk–ox, hare or just beef or pork based products. Fresh and frozen pasta is a product that has achieved success in the food market. The making of pasta is a relatively easy process and can be quite lucrative as a small business. It is a process that uses eggs in its manufacture. It is understood that in the N.W.T. there is now the availability of Northern produced eggs.

17. Pepperoni Seal & Caribou
18. Pepperoni Seal and Pork

Materials:
Seal & Caribou.

3 Kg. Seal Meat, lean, ground through 12mm plate, well chilled.
4 Kg. Caribou trim, sinewy meat, medium lean slightly frozen.
2 Kg. Caribou fat, tough fat only, slightly frozen.
1 Kg. Water Ice.

Spices.

230 gm. Hela Nitrite Cure
180 gm. Hela Hot Pepperoni seasoning.
140 gm. Hela Superbinder.
50 gm. Helabin X

Seal Meat and Pork.

Because of the increase in seal meat the pepperoni spice formulation needed to be changed from regular spice mix. The following is one that produced an acceptable product. The product did however have drawbacks that will require some additional work before a commercial product would be achieved.

10 Kg. Seal Meat, lean, ground through 12mm plate, well chilled.
4.3 Kg. Pork Fat. 3 mm ground.
3 Kg. Pork meat. 3 mm ground.
1.74-Kg. Water Ice.

Spices.

25 gm. Ground Fennel
25 gm. Ground Anise
40 gm. American Paprika
10 gm. Ground Caraway
14 gm. 40 Heat units Hot Pepper.
24 gm. Ground white pepper.
60 gm. Cutter Cure
14 gm. Sodium Erthorbate.
460 gm. Fine salt.
400 gm. Hard Wheat Flour.
400 gm. Clear modified starch.

Processing:

1. The meat and fat is ground and then well chilled about the point of starting to freeze.
2. The water is mixed with the meat.
3. Spices are then mixed into the meat. This can be by hand or in a mixing machine.
4. A casing is chosen and the product is stuffed into the casings.
5. After stuffing the product is smoked.
6. After smoking the product is stored at refrigerated temperature or frozen for longer shelf life.

General observations:

The product was tried on a commercial pizza. The results were interesting and acceptable. The original goal of this product was to produce a product that could be used on a pizza, such that an Arctic or Tundra Pizza could be offered in the North. The goal of obtaining a product identical to pepperoni was not achieved, however a product that is quite interesting and acceptable on a pizza was. The product was a mixed success.

As a result of this work and other work on other products it is recommended that a processed meat product be made that could be used on pizza but one that took advantage of the particular flavours inherent in seal. The direction of trying to reproduce pepperoni completely is not felt to be as desirable nor as achievable as it was at the beginning of the project.

Some of the basic spices used in pepperoni could be used but the addition of more or less or changes in some of the spices seems to be the best direction. This is based upon the reception of the products. Products that were reproductions or others were judged as better or worse than the original product. New products that were judged on their own merit were much better received.

19. Seal liver pate.

This product is covered at length in a demonstration on the video presentation.

Materials: 1 Kg. Seal Liver (defrosted)
(optional) 200 gm. Seal Meat Cooked and finely ground.
300 gm. Onions
300 gm. Bacon
200 gm. Butter

Spices
10 gm. Garlic Powder
10 gm. Finely ground Sage
10 gm. Marjoram
50 gm. Chicken enhancer
contains salt, Tumeric, M.S.G. + parsley
40 ml. Cognac

Processing:

The pate was made in the same manner as a goose liver pate would be processed. Some of the spicing used was varied to compliment the particular flavours of the seal liver.

Basic pate
1. The butter is placed in the bottom of cooking pan with the onions.
2. The liver is cut into 2 to 3 ounce chunks and placed onto the butter and onions.
3. The bacon is placed on top of the liver.
This is placed into an oven and cooked for about 20 min.

The spices and flavoring were added while the liver was still warm and before the product is completely ground. The product was put through successive grinds and mixing to produce the desired consistency.

When the ground pate is about 130 to 140'F the spices are added, but not the cognac.

Once the product has cooled and started to stiffen and coagulate then the cognac is added.

If desired cookd and finely ground seal meat can be added to the pate to give it a texure and different taste.

The product was very acceptable withthis addition of seal meat. Most people preferred tis product marginally to product without the meat added.

It was the put in forms and frozen.

General observations:

The pate was very well received by all those that tasted the product as long as they were not "liver haters".

It was rated by pate lovers as preferable to any other pate they had tasted. As a product it was exceedingly successful. It has a distinct flavour that is strong yet very pleasant. The product is relatively simple to make and sustains freezing and thawing well. It will definitely be a speciality item. To those who have tried the pate it would seem to be a product that would be acceptable to the gourmet palate. It has a rich and robust flavour leaving a pleasant after taste. It was compared to other pates purchased in local stores. The seal product was superior in quality and flavour.

The liver used in a pate superior in results to the liver being used in a liverwurst. It is recommended that when production is developed that as much of the liver as possible go into a range of pate like products.

Although the product has had limited exposure there has already been an offer to market the product across Canada and a restaurant that has inquired about having it on its menu. As a product it was more successful than hoped or expected.

In the presentations in Yellowknife and Iqaluit the pate was well recieved by most everyone. Of all the different products developed this one is the most gourmet type product and was exceptionally sucessful.

20. Cured and dried seal Jerky.

Materials: Seal Meat
Chest meat cut into strips.
or the meat cut from between the ribs.

Dry Cure (ratios)
10 gm Cutter Cure (64 ppm Nitrite)
20 gm Black Pepper (32 mesh)
5 gm MCP Lemon powder
365 gm Fine ground salt
10 gm M.S.G.

Processing:

Total amount of cure required is a function of the amount of meat processed.
The seal meat was cut in strips and rolled in a dry cure. The product was left with the cure for 48 hours. It was then produced into jerky in the smoke house.

General observations:

The jerky was very well received. The salt and spice levels could be varied a bit but that will be a function of the market. The product is very easy to make. The meat from between the ribs is very acceptable and preferable in a jerky to a smoked rib. The labour for removal is higher but it is felt that it is worth the additional production cost.

This product can be stored at room temperature is a known type of product in the North.

It was found that the jerky when sliced very thin was a very pleasant addition to a salad in the same manner as one would use bacon bits. This may have application in the hotel and restaurant trade.

In the use of the dry cure on the seal meat it was found that it was to salty. This can be lowered by not using as much of the dry cure on the meat.

The ratios of salt to other products can be adjusted for this product.

Other methods of making jerky would involve the rough grinding of seal meat and using a soya based superbinder. This would enable the jerky to be made in sheets such that there could be better portion control.

A fermented jerky was tried using this principle and the results were a more favorable looking product.

MANN TESTING LABORATORIES LTD.
FOOD SCIENCE DEPARTMENT

CIISTOHER: Science Systems
28 Maraboo Court
Brampton, Ontario
L6Z 1B4

REPORT: 890279-2

DATE: Mar.10, 1989

ATTENTION: Mr. David Ladd

TEST	SAMPLE
	- SEAL MEAT -
PROXIMATE:	
Moisture	68.9%
Pat	<0.1%
Ash	3.90%
Crude Protein	27.1%
METALS:	
Arsenic	0.04 ppm
Mercury	0.31 ppm
I. C.P. METALS SCAN (ug/g)	
MOLYBDENUM	<2.0
TUNGSTEN	<20
ZINC	26
PHOSPHORUS	>1000
LEAD	<4
BISMUTH	<4
CADMIUM	<1
COBALT	<2
NICKEL	2
BARIUM	<20
IRON	200
MANGANESE	<2
CHROMIUM	3
MAGNESIUM	<200
VANADIUM	<2
ALUMINUM	<200
BERYLLIUM	<1
CALCIUM	<200
COPPER	<2
SILVER	<1
TITANIUM	<200
STRONTIUM	<2
SODIUM	400
POTASSIUM	4400

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
M. E. Neale
CHEMIST

SIGNED: M. (Mike) Neale, M.Sc.,C.Chem.,M.R.S.C.

9279-1

MANNTESTING LABORATORIES LTD.

FOOD SCIENCEDEPARTMENT

CUSTOMER: Science Systems
28 Maraboo Court
Brampton, Ontario
L6Z 1B4

REPORT: 899279-1

DATE: Mar. 10, 1989

ATTENTION: Mr. David Ladd

TEST	SAMPLE
	- SEAL OIL -
ORGANOCHLORINE PESTICIDES	(SEE ATTACHED LIST
ALPHA-BHC	153 ppb
OXYCHLORDANE	315 ppb
DDE	558 ppb
PCB	CHANNEL 1: 920 ppb as Arochlor 1260 CHANNEL 2: 1460 ppb as Arochlor 1260 MEAN VALUE - 1160 ppb (NOT CONFIRMED BY MASS SPECTROMETRY)

SIGNED: _____

M.E. (Mike) Neale, M.Sc., C.Chem., M.R.S.C.

Pest-Scr

PESTICIDE SCREENING - LIST 1

(Meat Products)

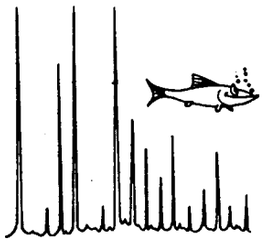
Organochlorine Compounds	Limit of Quantitation (ppm)
alpha-BHC	0.02
beta-BHC	0.04
gamma-BHC	0.02
delta-BHC	0.02
Heptachlor	0.02
Aldrin	0.02
Oxychlordane	0.02
Endosulfan I	0.02
Endosulfan II	0.02
p,p'-DDE	0.01
p,p'-DDD	0.02
PIP'-DDT	0.03
Methoxychlor	0.03
HCB	0.02
Dursban	0.02
Heptachlor epoxide	0.02
gamma-Chlordane	0.02
alpha-Chlordane	0.02
Dieldrin	0.02
Endrin	0.02
Ethion	0.02
Ronnel	--
Mirex	--

FISH LIPID ANALYTICAL SERVICES LTD.
Omega - 3/EPA Specialists
19 Maplewood Dr.,
Guelph, Ontario
Canada N1G1L9

January 27, 1989

WT. % of TOTAL FATTY ACIDS

Fatty Acids	Sample No. 4
16:0	8.5
16:1	22.3
18:0	1*2
18:1	26.5
18:2	1.7
20:1	6.4
20:5 (EPA)	0.2
22:1	1.1
22:5	5.0
22:6 (DHA)	9.5
Total fatty acid in mg/g sample	828
Cholesterol in mg/100g sample	73



FISH LIPID ANALYTICAL SERVICES LTD.
Omega - 3/EPA Specialists
19 Maplewood Dr.,
Guelph, Ontario
Canada N1G 1 L9

WT. % OF TOTAL FATTY ACIDS

Fatty Acids	Original	High ME'	Low MP
16:0	4.6	6.7	5.2
16:1	21.9	20.5	23.3
18:0	0.6	1.1	0.7
18:1	26..4	25.9	28.2
18:2	1.9	1.8	1.9
20:1	8.2	8.8	8.5
20:5(EPA)	9.6	8.9	8.5
22:1	0.9	0.9	0.7
22:5	6.5	6.2	5.2
22:6(DHA)	10.5	9*9	8.2
Total fatty acid in mg/g sample	835	862	73Q

MANN TESTING LABORATORIES LTD.

FOOD SCIENCE DEPARTMENT

Customer: **SCIENCE SYSTEMS**
28 Maraboo Court
Brampton, Ontario
L6Z 1B4
Attn: Mr. David Ladd

Report # : 882534

Date : **November 9, 1988.**

TEST	SAMPLE **SEAL OIL**
α- BHC	0.03 **ppm**
MI REX	**0.03 ppm**
ORGANO-PHOSPHATE PESTICIDES	**None Detected**
TOTAL PLATE COUNT	<10 g
CONFIRMED COLIFORMS	<10/g
E. COLI	<10/g

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
M. E. Neale
CHEMIST

Signed: _____
M.E. (Mike) Neale, **M. SC.** ,C. Chem.
M. R. S.C.

news north **BUSINESS**

More than 25 different products

Seal meat could be the newest delicacy

There probably is not a single restaurant south of 60° which has seal meat on its menu, but that could change very quickly if David Ladd has anything to do with it.

Michael Sharpe
NEWS/NORTH

Ladd and his company, Science Systems Research and Development, have developed over 25 different food products made wholly or partly from seal meat. The products were developed over the past four months with the help of university and industry experts.

As he will admit himself, some of them were "absolutely horrid." But some of them can only be described as delicacies.

The foods range from seal jerky to consomme and pate, and have both surprised and impressed a number of well-educated palates, says Ladd.

Ladd served over a dozen of the foods to government and food service industry representatives to see how they would be received, at a special event in the Gold Room of the Yellowknife Inn last Monday.

The various hot and cold dishes were served up on silver platters and in steaming trays on a long, burgundy colored buffet table. It could have been a scene from any restaurant or reception.

The lucky guests were able to sample ravioli, seal and caribou pepperoni and salami pizza, seal and mushroom pie, liverwurst, and smoked loin.

"The honorary president of the Chef's Association of Canada said the consomme should be served in the best restaurants and clubs in Canada," says Ladd.

"I'm most pleased with the consomme and the pate. In the case of the consomme, partly because it's very good, but also because of the process that led up to it."

SharpeNNSL photo

Among the products sampled was Netserloin, a smoked seal product named for Coral Harbour hunter Joe Netser who provided many of the seals used in the study.

Used all the seal

"We were boning a seal, and I said, 'Lets use the whole thing.'" One of the people working with Ladd took the bones away, and within a few days had produced the consomme.

Ladd says that from early on it was obvious there would not be enough seals to supply a very large demand, and so he concentrated on developing first rate foods.

"Some people in Norway and Newfoundland have been working on this for six to eight years. Others have said, 'Lets feed it to the dogs.' But we were not looking for traditional stuff. We wanted to be creative."

Developing the foods was a real process of trial and error, says Ladd. "Seal meat is not like any other meat. It has three main flavours. The predominant one is fish. This can be enhanced or hidden, depending on how it is prepared and what spices and other ingredients are used. The second is a liver taste and the third is blood."

Ladd adds that seal meat also reacts very differently to spices than other meats do.

Keeps vampires away

"The seal pepperoni is point two per cent garlic. In most other meats this would be enough to keep vampires away."

Ladd's company was hired by the Department of Economic Development and Tourism's Keewatin region to do the study, as part of a broadly conceived plan to find new uses and markets for seals harvested in in the N.W.T., says Syd Kirwan, director of natural resource development for the department.

"The development of new uses for seals is just one part of an attempt to strengthen regional economies — arctic foods are an important part of this.

"This study was initiated by the minister of Economic Development and Tourism, and is one component of an Inuit seal product strategy. We are also looking into new uses for seal oil and seal hides.

"I am exceedingly happy with the products produced," says Kirwan. He adds that if the response continues to be as positive, and if the people in the seal harvesting regions are interested, the technology developed over the course of the study can be transferred North.

"We will encourage people to seek funds through the Economic Development Agreement and the Renewable Resources Enhancement Program for the development of these products in the North."

Among the guests were the head chef and catering manager of Yellowknife's Explorer Hotel. Manager Fred Omari's first question to Ladd was, "do you have enough? There was no doubt in his mind that the foods were a success.

"I liked them all. I think the presentation is very beautiful, they can display them in very many ways in my opinion they will have a huge market."

Oman says that Ladd's pricing estimates were very reasonable and that he thinks most of the foods would be very good for use as canapes and appetizers, especially at conferences and special events.

Kitikmeot wants more flights

Craig Harper
NEWS/NORTH

The Kitikmeot Board of Education is circulating a petition to improve air service to Coppermine.

Board chairman Dennis Lyall says N.W.T. Air's service to the hamlet has decreased over the past year just as the Department of Education's regional office has been moved from a more central location in Cambridge Bay.

Cambridge Bay, N.W.T.

The airline used to provide three flights a week to Coppermine using the Lockheed Electra but has reduced it service to two flights a week, one of which uses a Twin Otter.

"If we want to do any travelling from Coppermine we have to charter and stay in hotel. We could use that money for another teacher."

Lyall says the poor air connections prevent the department's resource people in Coppermine from travelling as extensively as they should. "We've having a hell of a time getting out of Coppermine."

Lyall is critical of the the territorial government's decision to decentralize services in the region without ensuring adequate connections. Although 70 per cent of the region's 1,000 students live in the four eastern communities, including Cambridge Bay, the resource people are stationed the more westerly Coppermine.

"If the N.W.T. government is real-

Tug named after priest

Michael Sharpe
NEWS/NORTH

Esso Resources Canada has named its new tug boat in Norman Wells after an Oblate missionary who spent 45 years in the Arctic, and was well known as a navigator and river boat pilot on the Mackenzie.

The new tug is a "vast improvement over the old one," says Sam Polovnikoff, Esso's warehouse

enzie River, and Paulatuk on the Arctic Coast. And between 1967 and 1970 Binarne was a chaplain on the DEW line.

Details of Binarne's life recorded by an unknown author, reveal that Binarne was a man of many talents who put his hand to anything and everything in the service of the people of the North, says Ted Bower, with Esso Canada Resources in Calgary

GJOA FITS IN A BOTTLE

The NWT's third historic park opened just after Labor Day in Gjoa Haven, on the Arctic Coast.

Unlike its predecessors, (the Thule Inuit park called Qaummaarviit near Iqaluit, and the whaling site near Pangnirtung called Kekerten), the Northwest Passage Historic Park is centered on the community. Cairns and plaques mark sites throughout the community, where visitors are invited to imagine the life and times of coastal Inuit, as well as the European explorers who tested the Northwest Passage.

The community's name recalls the Norwegian explorer Amundsen's ship the *Gjoa*, which wintered here in the first successful traverse of the Passage.

The model of the *Gjoa* shown here was sent to the school in Gjoa Haven by a Norwegian visitor, and is on display in the interpretive centre.

HARES WAYNE'S FRIENDS

Wayne Hardy doesn't have much trouble keeping busy as a meteorological and radio technician at Echo Bay Mines Ltd.'s Lupin mine. When big trucks are rolling, he and his colleagues produce 17 weather reports each day from their post, 400 kilometres north of Yellowknife by air and 600 km by ice road in winter. And if Wayne gets lonely, on duty by himself at the weather station near the Lupin airstrip, he just sticks his head out the door and whistles. That brings Arctic hares bounding in from all points of the compass. They've developed a passion for the apples Weatherman Wayne feeds them. (This visitor is wearing his winter coat.)

Erik Watt

Wayne Hardy and friend, left, on the job at Lupin.

BRAND "X" MEETS THE GOURMET TASTERS

The nibble and munch crowd were out in force in early fall at government receptions in Yellowknife and Iqaluit as a new northern product line was taste-tested. Of the dozen or so items presented, a couple rated 10s and several rated 8s and 9s, according to the 50 or more "gourmets" present at each event.

It was quite a coup for David Ladd, from Brampton, Ontario, who calls himself an environmental economist or an agrologist, depending on the topic under discussion. David had assembled a culinary team including a master sausage maker, and Fred Scoll, chef, and Frankfurt gold medalist for Canada in the new foods catagory. Others have attempted the same project in the past, taking years, and ending in failure. David's team succeeded, in a matter of four or five months.

"You have to let the resource dictate the end product," says David. "These foods are not replacements for anything — they are new products from the North, that are designed to appeal to southern palates. They will eventually have names to reflect that Northern magic."

Among the top rated dishes were a consomme with the delicate flavor of turtle soup, and a Tundra Pie swathed in mushrooms and wine flavored sauce. Yellowknife Inn chef Patrick Kane said he'd be proud to serve either one. Netser Loin (named after the Inuk who harvested the meat) had an exotic flavor that almost everyone rated tops. And there was a galantine of light and dark northern meats glazed with northern cranberry that simply disappeared as guests mingled and nibbled.

How do you arrive at a gourmet taste sensation starting with a meat that tastes of fish and liver? "You manipulate the flavor package," says David, adding, "there's 5000 years of western and eastern culinary technology to draw on. We have access to that knowledge today, and we can apply it scientifically to enhance or disguise flavors.

"We set out to make products you could not make with any other meat, and we went for the "gourmet" edge, so that at the very least we'd end up with an acceptable product." The aim was to use all parts of the animal. It wasn't all smooth going. "Some of our first tries were simply inedible." But it would seem the creative juices won out in the end.

So what's the secret, that's long eluded others, to making seal meat acceptable to modern North American palates? David won't reveal his selection of ingredients yet, except to say that caribou goes well with seal, but beef does not.

"The recipes need to be perfected, and analysed from the point of view of economics," he adds. Eventually, David sees these gourmet dishes being prepared at the community level, where the key ingredients are plentiful.

Now that the feasibility study is done, the project is back on the plate of the Government of the NWT. It was their project, part of a multi-faceted attempt to use yet another Northern renewable resource to assist Northerners to make a living. Whatever the project's fate, there are now at least a hundred northerners dreaming of Netser Loin, and Tundra Pie, and wondering how on earth they were made.

PHOTOMANIA

Well, we know the prizes are good, but we certainly didn't expect the deluge of entries we've received for *Up here's* northern photo contest. There are more than 200 entries, and we're still counting. We'll be announcing the winners in our January issue.