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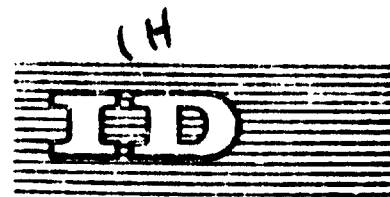
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CO-OPERATIVE SLAUGHTERHOUSE AND FOOD INDUSTRY
IN KRISTIANSTAD, SWEDEN ^{1/}

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CONTENTS

Introduction	1
Members department	4
Marketing department	5
Financial department	7
Engineering department	7
Personnel department	7
Procurement of pigs	8
Slaughter house operations	11
Cutting operations	17
Meat emulsion section	18
Sausage section	20
Canning	21
The Central Kitchen	22
Sanitation and hygiene	25
Quality Control at KBS	28

Introduction

The following table and diagrams offer a summary indication of the scale of operation and the organizational structure of KBS.

Table 1

	1969	1970	1971	1972	1973
Total turnover mill. Sw.Cr.	355,6	422,5	416,2	446,9	496,1
Members	8,298	7,969	7,530	7,185	6,930
Employees	722	808	826	849	832
Total slaughter volume (in metric tons)	38,3	40,5	42,4	44,1	42,5
<u>Slaughter</u> (in 1000animals)					
Pigs	436,6	451,7	493,3	538,0	509,5
Cows	10,3	9,2	8,4	6,7	7,3
Young beef	21,6	24,7	23,7	19,0	18,2
Calves	6,0	6,5	7,0	5,2	4,8
Different (sheep etc.)	6,9	6,0	6,9	4,6	4,8
<u>Sales</u> (in metric tons)					
Whole carcasses	21.552	18.856	22.280	23.650	20.006
Cuts	18.378	20.150	16.705	16.052	18.657
Sausages, hams etc.	3.946	4.365	4.260	4.457	4.686
Lunch portions, convenience foods	1.800	2.100	2.376	2.442	2.353
Canned products for human consumption	2.482	2.947	2.558	2.511	2.339
Pet food	2.573	2.820	3.023	3.023	3.227

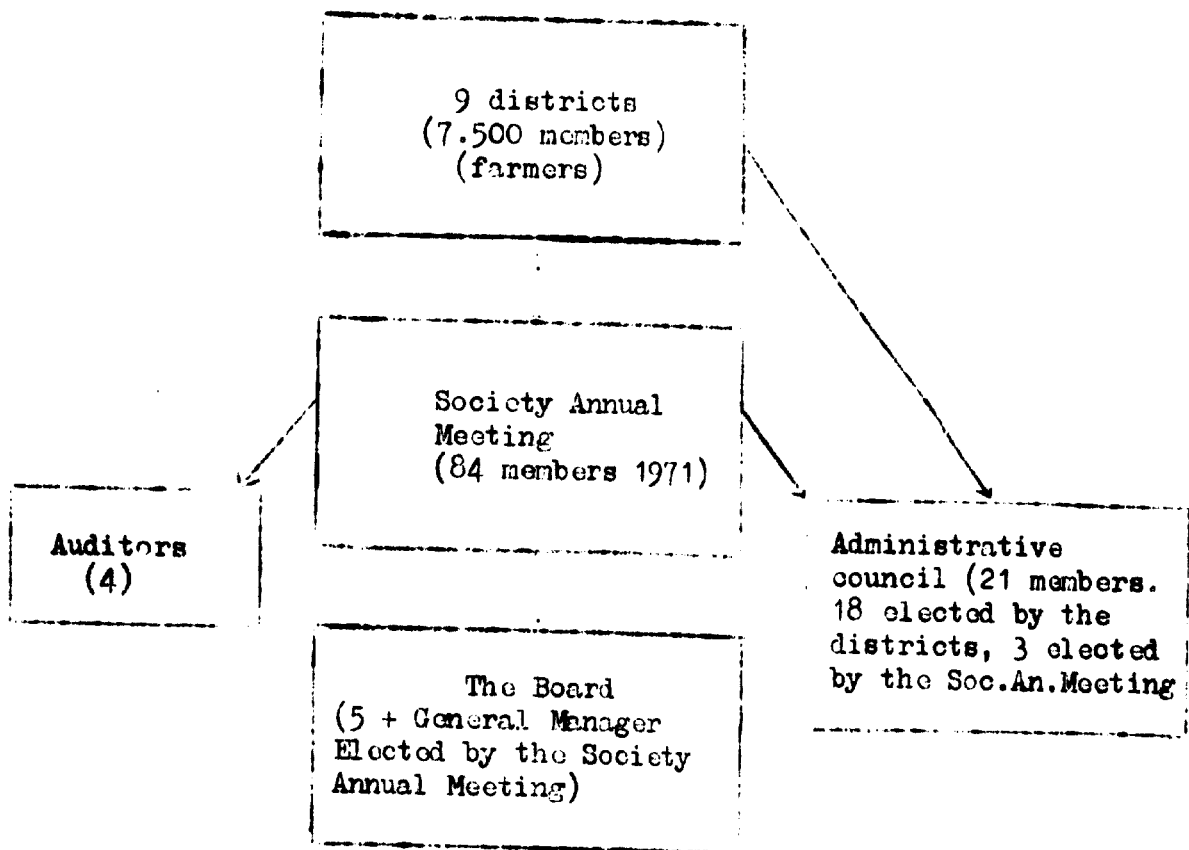
Kristianstad-Blekinge Slakteriförening's parliamentary organization

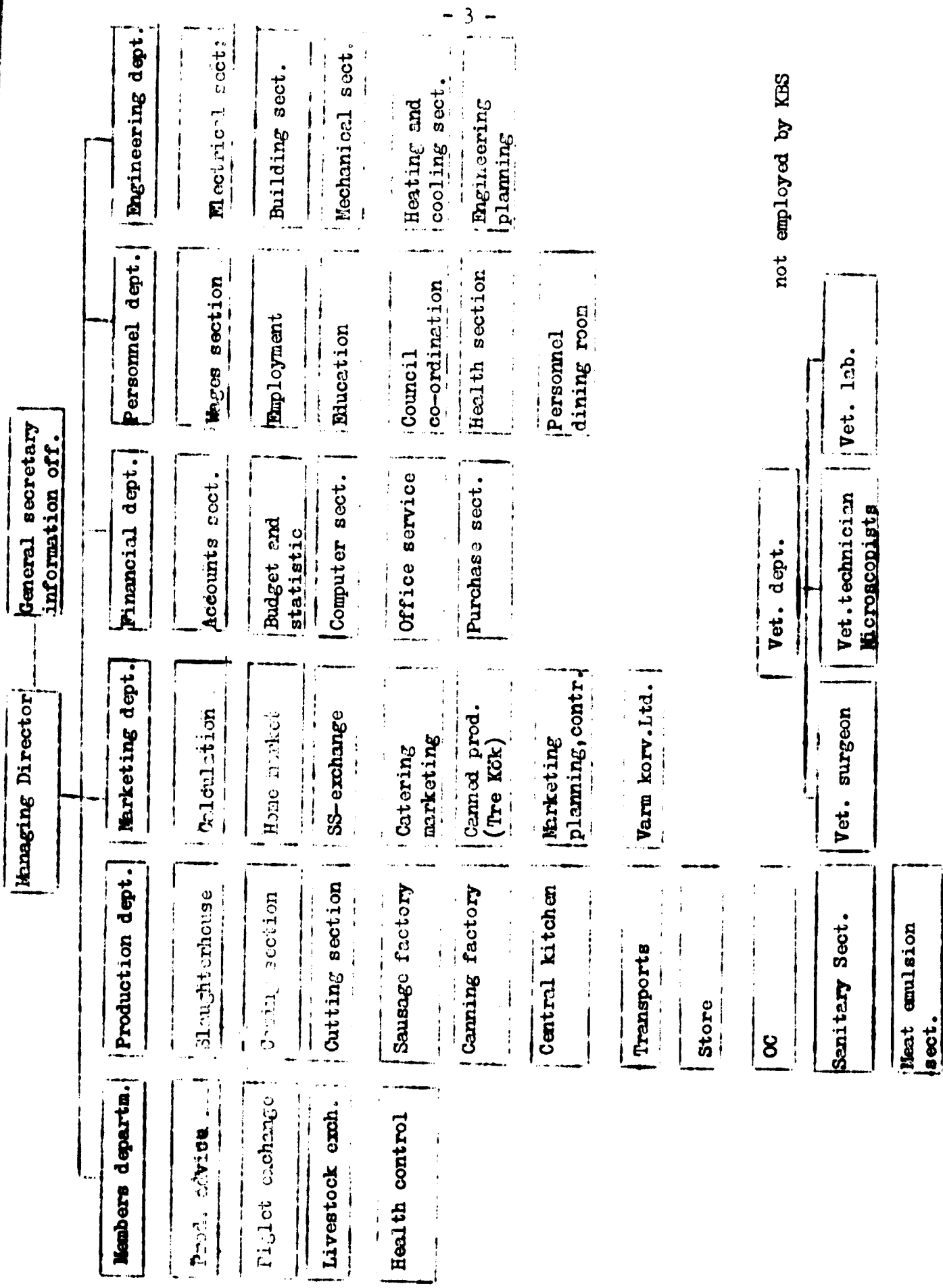
The Society's region is divided into nine districts.

At each of the nine district meetings a representative is elected for each 100 members.

Each district also elects two members to the Administrative council.

Diagram 1





not employed by KBS

The Members Department

This is a new department established in 1969 - 70 to safeguard the farmers' interests. It offers service and advice on new techniques of breeding, rearing, etc.

Auctions

The department is responsible for the organization of livestock auctions. These are held approximately 40 times a year and allow for the interchange of weaners, calves, steers and other breeding stock between farmers. Many farmers specialize in one part of the livestock production, e.g. rearing weaners on fattening stores and these auctions allow a convenient flow of livestock between farms. Nine thousand animals pass through the auction per year, and the total turnover is 10 million Sw.Cr.

In the auction hall there is an annual exhibition of prime animals ready for slaughter to show farmers animals of the required quality.

KBS even arranges auctions on farms at the request of its members.

Exchange of livestock

The department also offers a scheme for ^{the} exchange of livestock without the need for auctions. Some 270.000 piglets, 3.000 calves and 1.200 hog and swine are transferred through this scheme per year.

Health Control

The department is also responsible for checking that correct sanitation is maintained in pig houses, that livestock is healthy and receiving a balanced diet.

Livestock found to be in a healthy condition is given a health card by a veterinarian. Health is re-checked periodically by technical assistants and farmers are only allowed to sell piglets, if they are born from certified sows.

These health cards are valid for one year.

Breeding Control for Sows

On attaining a weight of 80 kg or more, gilts raised from a certified sow are inspected for functioning teats, and graded using an ultrasonic test for back fat thickness. It is essential that every gilt used for breeding should have at least 12 evenly spaced teats.

450 farmers are associated with this service and the aim is to attain a K-gris (a genetically improved pig). In 1971 30% of the total exchange of pigs were K-gris.

Delivery contracts

Annually the department draws up 900 delivery contracts for about 400.000 pigs, 5.000 cattle and 900 calves. These contracts cost KBS 1 Million Sw.Cr. per year, but the cost is offset by steady supply of pigs.

The department also arranges loans and credit facilities for the farmers.

The department organizes meetings for farmers, educational courses (Study Circles) and general discussions between KBS management and the farmers (KBS against the wall). The department is also responsible for the dispatch of various bulletins to members.

The Marketing Department

Various KBS products, such as whole carcasses, retail cuts, sausages, other processed goods and canned products, are sold through the marketing department which is an independent wing functioning under the Managing Director. The chief is assisted by 34 personnel, who are looking after the sales work at KBS. The annual turnover in terms of money for the year 1971 was 416,2 million Swedish Crowns. During the three quarters of the year 1972, the sales of different products were as follows:

SS market	- 11,300 metric tons (Swedish Meat Marketing Association)
Home market	- 4,200 metric tons
Three kitchens	- 4,400 metric tons (Sales Company for canned products)
Hot meals	- 1,400 metric tons

50% of the products are marketed through SS, and it would be appropriate to discuss this organization as a separate buyer.

Home Market

KBS has a fixed area of operation with 300,000 consumers. Home market sales are organized through five travelling supervisors and seven telephone sales girls. The touring supervisors advise their customers regarding new products and their marketing; they book orders, look into complaints, and help in the display and publicity of products. The orders collected on the road are passed on to the special section at KBS the following morning.

Every telephone sales girl has a list of customers to be called; they have a card for each customer with their code number, address, phone number, etc. Customers are contacted daily or twice a week depending on the volume of their business. Orders are booked till 2 p.m. on special order forms and are passed on to the special section at KBS, which checks the code number and the quantity, etc. They also put the selling rates on the orderform.

These scrutinized orders are then passed on to various despatch sections: (a) Carcasses (b) By-products (c) Sausages and retail cuts (d) Pre-packed products and (e) Hot meals. Separate orderforms are used for each despatch point where the despatcher makes different packets according to the order sheet; weighing is carried out on automatic scales, the customers order number, code number, quantity despatched, price etc. are simultaneously typed on the machine and the data fed to the computer for further processing. A copy of this despatch sheet along with the order form is packed with the goods in the container. Refrigerated vans used for transport of various products have their fixed routes.

The prices of products quoted to the customers by KBS include transport charges, except whole carcasses, transport charges of which have to be borne by the customer.

Prices of various products are reviewed every week on Friday, after the relevant rates for whole carcasses are fixed by SS. The customers are then provided with the revised prices which are effective from the following Monday. Terms of sales are strictly cash, except for those customers to whom credit facilities have been allowed against bank guarantee. Customers are allowed discount on the quantity of purchases made in a week. Besides discount, the customers are given a yearly bonus. Discount is allowed only on sausages, finished products and retail cuts.

The smaller customers are required to make payments in advance or to the delivery van driver at the time of delivery. The big stores, to whom credit facilities have been extended, are required to make payment within 10 days of the receipt of the bill from the accounts department, failing this, interest is charged for each day of delay.

KBS also has facilities to take back products whose date codes have expired or which have been spoiled owing to manufacturing defects. These products are replaced free of charge, and annually amount to approximately 1-2% of the total volume of sales.

SS Market

The Swedish Farmers Meat Marketing Association (SS) is the largest producer co-operative organization and covers the whole of Sweden, the head office is located in Stockholm. The SS is the supreme authority for pegging the prices of carcasses and livestock. Sales in Stockholm and Göteborg, Sweden's two largest cities, are dealt with by the SS. It sells the surplus of its member co-operatives products and exports the remainder to other countries.

At KBS the section handling the SS market receives orders by telex and telephone until Wednesday mornings. Complete order lists, quantities, dates of delivery, names and addresses of customers are given to despatch who then compile and deliver the goods. The accounts department sends a complete list of goods despatched for

SS and receives payment from them at special rates, valid for the SS market.

SS is also responsible for market research.

The Financial Department

The department is responsible for long-range budgeting as well as everyday monetary affairs. Affiliated to the department are the computer, office service and purchasing sections.

The factory financial year is divided into 13 four-week periods, to allow direct comparisons between periods and to standardize inventory analysis.

All accountancy and statistical work is done by computer. All data from automatic weighing and cooling of products etc. is first processed on a mini-computer before being fed into the large computer, which also processes all data concerning the production of hot meals by the central kitchen.

The department also procures all the equipment needed by the factory and runs the internal post and printing services.

The Engineering Department

The department's prime function is to maintain all machines in working order with minimum interruption of production. For major repairs or installations the department acts as a co-ordinator in employing external assistance. The department also has a comprehensive range of spare parts for all machines in the factory for immediate repairs. The department is always involved in the changing and installation of new equipment.

The Personnel Department

The department is responsible for the employment, health, education and general welfare of the workers and handles the wages and salaries within the firm.

In Sweden there is an enlightened view towards industrial relationships in an attempt to try to break down old management/worker barriers. Much of the work of the department is involved in informing and promoting new ways of communication, e.g. many hygienic and safety problems are solved by various worker/management committees.

A modern health centre has just been built employing two doctors and three nurses. This is financed in conjunction with various firms in the town.

Procurement of Pigs

It is obligatory on the part of members of KBS to supply all their slaughter stock only to the Kristianstad-Blekinge Slakteriförening. The KBS area has been divided into 20 transport districts. Each district has one transporter. The farmers inform their transporter (on Monday, Tuesday and at the latest by noon on Wednesday) about the livestock they are going to supply next week for slaughter. They also inform their transporter of the type of animals (i.e. lamb, steer, sow, gilts, etc.), the number they are going to supply, date of delivery as well as their membership number. The man in charge at KBS collects all this information from the 20 district transporters on Wednesday from 12.30 p.m. by telephone calls. The consolidated position of livestock available for slaughter in the next week is forwarded to the Swedish Farmers Meat Marketing Associations (SS) office in Stockholm on Thursday, which then inform KBS about the price of dressed carcasses and also the requirements of the SS market.

KBS then calculates the price that can be offered to the farm producers based on various other factors. A chart of the price calculation system is enclosed. On Fridays KBS informs the farmer-members the prices they are going to be offered for the next week. A slaughter plan is then made for each of the five working days of the next week. The demand of the home market as well as the SS market is taken into consideration. A plan of transport of livestock from farms to KBS is then made to match the plan of slaughter. The district transporter then informs all the farmers concerned about the date and time the slaughterstock will be collected from their farms. The price offered by KBS to the farmers for their slaughterstock is the same irrespective of the distance and location of their farms. No transport charges are paid by the farmers.

The weighing of carcasses is done on automatic weighing scales and recorded through computers. The grading of carcasses is done by Govt. graders. Transport contracts are made for the whole year. To facilitate calculation of transport expenses, the entire area of KBS has been divided into 3 km x 3 km squares. The various items of expenditure have been worked out on a unit basis per animal.

Payment to the farmers

Payment for the livestock supplied to KBS is made on their dressed weight, quality and grade.

Table 2

P I G S (dressed weight)

Grade	Less than	prices in öre/kg																
		14,9	15-34,9	35-49,9	50-54,9	55-57,9	58-59,9	60-63,9	64-65,9	66-67,9	68-69,9	70-71,9	72-73,9	74-75,9	76-79,9	80-89,9	90-99,9	100- and
Ex Choice				450	465	480	480	480	480	480	480	465	465	465	465	465	455	
Coice			420	440	460	460	460	460	460	460	445	445	445	445	445	440	435	
1	280	380	335	360	385	395	425	425	425	425	420	420	420	420	420	415	415	380
2	280	280	335	340	345	355	385	385	385	365	385	385	380	380	380	380	380	380

Carcass grading is dealt with in the chapter on slaughtering: various types of bonus are offered to the farmers: if more pigs are collected at the same time at the farm the farmer is paid extra.

- 5 to 9 pigs - 50 öre per pig
- 10 to 29 pigs - 1 Crown per pig
- 30 and above - 2 Crown per pig

Diagram 3

Calculation of Producer's Price

	<u>Pork</u>	<u>Beef</u>
Wholesale price	6,06	7,66
Net receipt from by-products	<u>0,47</u>	<u>1,00</u>
	6,53	8,66
Minus		./.
Transportation and slaughtering	0,35	0,35
Costs of sale and administration	0,15	0,15
Internal price regulation	0,10	0,10
Charge for slaughtering	1,05	0,40
Dividend bonus to the producers	<u>0,10</u>	<u>0,12</u>
	1,75	1,12
Indicative price to the producers	4,78	7,54
Actual price to the producers	4,75	7,55

Slaughter House Operations.

The slaughter of pigs

For the antemortem examination, the workers are instructed to detain injured or otherwise dull animals, which are slaughtered in the Sanitary Slaughterhouse. If necessary a veterinary surgeon is called to inspect the animals. Farmers are provided with sufficient technical know-how to raise healthy and good quality pigs and are encouraged to deliver only clean stock.

The pigs are washed and driven to the carbon dioxide chamber through a narrow passage with the help of a 6-volt electric gun. Water showers are provided in the passage to keep the pigs cool and clean. The pigs enter the carbon-dioxide gas chamber on a conveyor and are subjected to an atmosphere of 90% CO₂. It takes about two minutes from the entrance to the shackling platform. The pigs are shackled, hoisted and stuck within 10-15 seconds after anaesthetisation. It is claimed that higher concentration of CO₂ produces no adverse effects, in fact it induces complete bleeding. There is also provision for electrical stunning for emergencies.

For hygienic blood collection, the pigs are stuck with a special type of knife with a tubular stem, to which a plastic tube is attached. 25% sodium citrate solution is continuously drip-fed into the stem as an anti-colagulant, at a regulated rate of four litres of sodium citrate solution per 100 litres of blood. Bleeding time is 10-15 seconds per pig, and approximately 1,5 - 2 litres of blood are collected. The blood flows via plastic tubes to the blood-plasma processing plant. To minimize the bacterial load, the sticking knife is washed and steamed from time to time and the plastic tube is also changed at intervals.

Any further blood drained from the pig falls down into a tank whence it is pumped to the rendering plant. The pigs are then laid on a table to allow the blood to drain from the head and hams, and the method of suspension changed from a chain to a solid bar stuck between the hoof and tendons of each rear leg. An average of 2,200 pigs are slaughtered per day.

The carcasses are then carried on a conveyor to the scalding. The scalding time is (6 x 60) 360 secs. at a temp. of 62°C with superheated steam. Simultaneously the body hair is removed by blades. These blades have a paddle-like motion, the individual carcasses slowly rotate on a vertical axis, thus ensuring a high degree of cleaning. The line of carcasses enters an oven where a twelve-second pressurized spurt of flame singes any remaining hair or stubs of hair.

After singeing the carcass is carried to a tunnel with warm water sprays and a series of horizontally inclined, rotating nylon brushes, which remove any hair in the axillary and mandibular regions.

A further set of brushes remove hair and debris from the feet after emerging from the flow tunnel.

Manual cleaning of the body.

Each carcass is then scraped free of any remaining scum, or any undesirable pigment left by the charring of the oven, and split open at the throat; followed by "de-earring" and extension of the incision along the midventral line.

The carcasses are then eviscerated of the bowel and the genito-urinary tract (discarded). Stomach, spleen and intestine are directed into the cleaning room for the manufacture of sausage casings and dog food.

The cleaned intestines, free of parasites (as worms), are pressed between rollers to evacuate the mucous membrane using a hot water treatment; the procedure is repeated, until a transparent and very thin casing results. This is stored in saturated brine until further use.

The next stage of cleaning entails the removal of the pluck (i.e. heart, lung, diaphragm and the liver lobes). Any extra-peritoneal fat is sent into C and room. The carcasses are "de-tailed" and the tails collected to be pickled in the meat room.

Scalding and de-hairing.

The KBS method of scalding is of a vapour type as opposed to the old water type. The pigs remain hanging through the scalding period of approximately 6 minutes. This prevents the lungs and body of the pig becoming full of water and guards against obvious entry of microbiological infection.

Steam at 180°C enters the chamber, but is immediately cooled to 62 - 63°C by cold water sprays. This produces a fine vapour which circulates throughout the chamber. The pigs are rotated on a vertical plane and scraped.

To remove the remaining hair, the pigs are passed through a flame at a temperature of approximately 900°C for 5 secs. This process is again followed by scraping and brushing, the forelegs receiving rotary brushing and the hind legs vertical brushing and washing. The process line begins with de-earring (the ears go to dog food plant), followed by manual scraping and then removal of intestines, gut etc. - these are sent via a chute to the casing/cleaning department. Thereafter the kidney, heart, lungs, etc. are removed to a separate line and given the same number as the carcass. A sample of the diaphragm muscle is taken for trichinella testing.

Grading

Four grades are used to classify the quality of meat: these grades are dependent on fat thickness

<u>Back</u>	<u>Side</u>	<u>Grade</u>
20 mm	24 mm	Extra Prime
25 mm	29 mm	Prime
25-29 mm	29 mm	Class I
29 mm		Class II

If only one of the measurements exceeds the specification for a high grade, the grade is still taken as the lower.

Two instruments are employed to measure fat thickness:

- a) a graduated stick is inserted into the back between the last thoracic and the first lumbar vertebrae - when the stick is stopped by these bones the measurement is taken.
- b) an optical instrument is inserted into the pig's side. This instrument works on the principle that light will only pass through the regions of fat in the pig's body. Light is shone in the body through the instrument and the observer notes the appearance and disappearance of the light, subtracts the two readings and obtains the thickness of the fat.

Veterinary inspection

A visual inspection of the pluck is carried out and any inflamed or infected parts removed prior to the pluck entering the cold room. A visual check is also performed on the carcass.

Sterilization

This is a hot air chamber (temp. 450°C) through which the pigs pass for 10 secs.

The carcasses are then marked with the following information:

- 1) Production number
- 2) Number of vet., who tested carcass
- 3) Mark to certify a trichinella test has been carried out
- 4) Slaughter-house number
- 5) Farmer's number
- 6) Grade

This marking is followed by a final scrape to remove any remaining dirt. The carcass is then weighed automatically and the following information is fed into the computer.

- a) Slaughterhouse number
- b) Farmer's number
- c) Grade
- d) Weight

The carcasses then pass into the shock cooler (temp. -10 to -12°C) for 70 mins, this results in a cooling of approximately 6°C the pigs being at a temperature of approximately 32°C upon emerging. They are then held in a chilling room temp 0°C -4°C overnight, where they attain an optimum cutting temperature of 6°C.

Diagram 4

Flow Diagram of the pluck and the eviscerated carcasses.

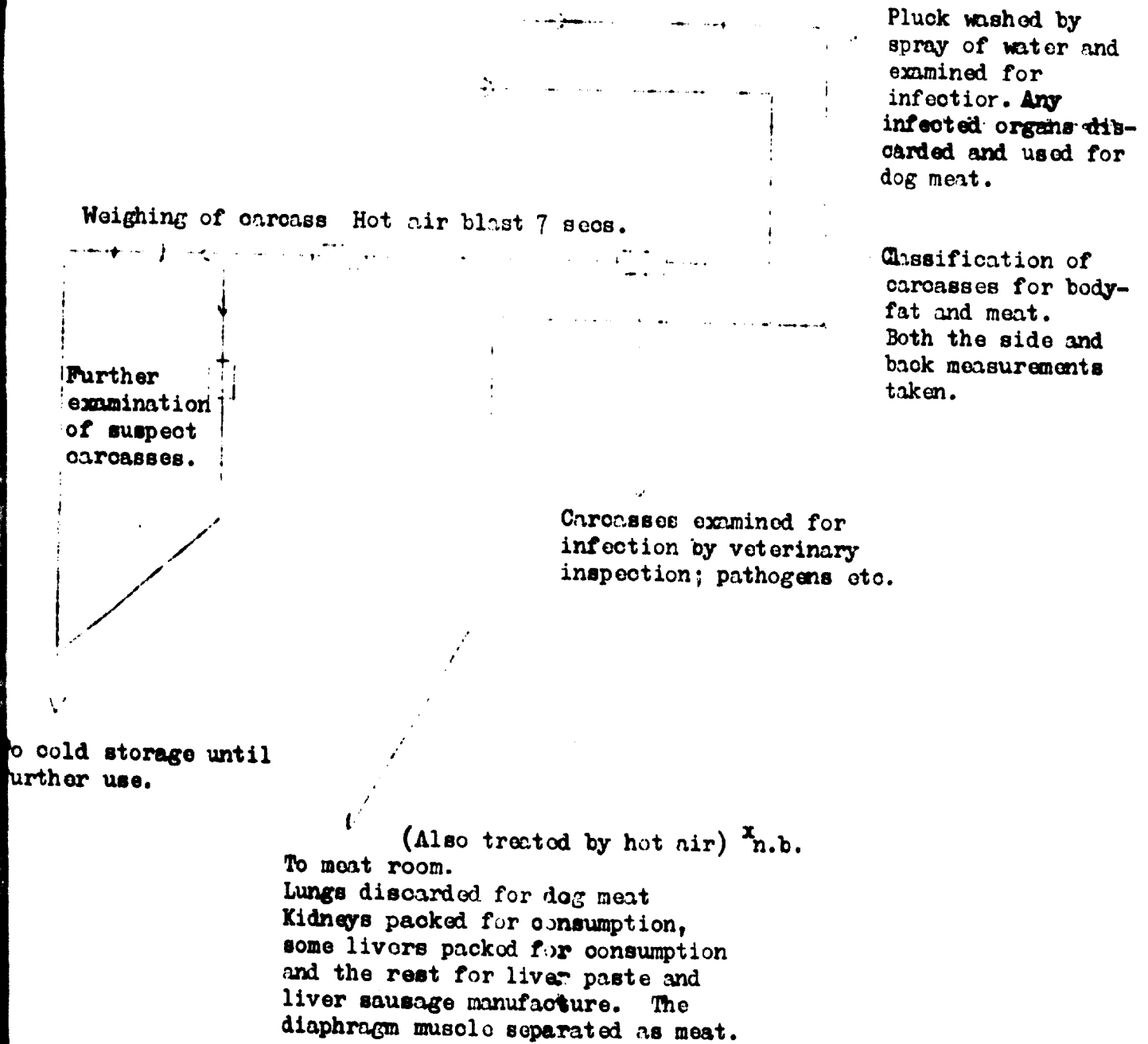
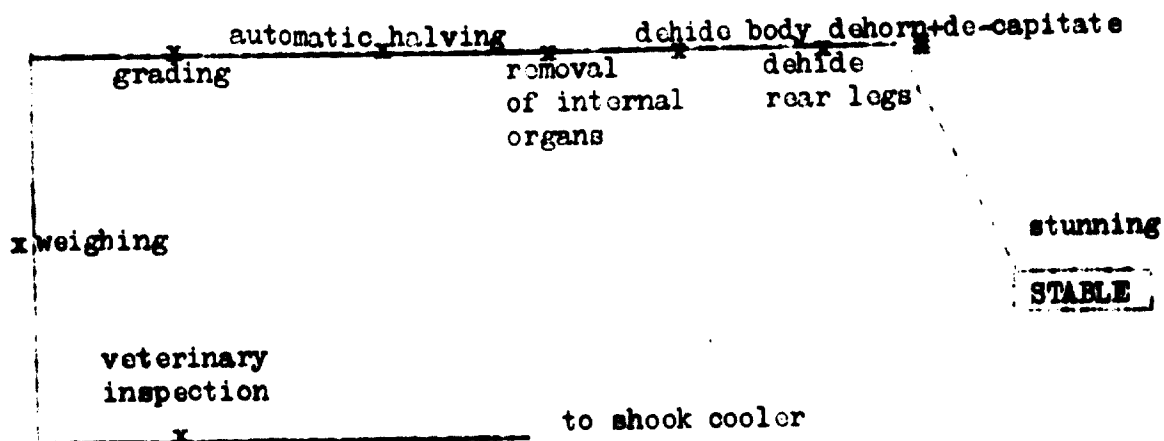


Diagram 5

The slaughter of cattle

Flow Diagram



The slaughter process requires 9 men and can accommodate 22 cattle/hour.

The cattle are first stunned using the captive bolt, shackled by the hind leg and "stuck" in a similar manner to pigs.

The cattle then proceed through the following operations:

- 1) Removal of horns, hoofs and de-capitation.
 - 2) The hide is removed and sent via a chute to the hide cellar for treatment.
 - 3) The body cavity opened and internal organs removed, the intestines etc. removed and the gut sent to casing department.
 - 4) Carcass washed and automatically sawn into halves and any excess fat removed.
 - 5) Grading, inspection, weighing and despatch to cool room.
 - 6) The carcass is then cooled for 4 hours at -2°C and then transferred to a chill room and kept there overnight.
- The carcasses are then ready for cutting the following day.

Sanitary slaughter

This part of the factory is separate from the rest to minimize risk of infecting good meat. The sanitary slaughterhouse deals with all sick or diseased animals which require immediate slaughter. The good meat obtained from these animals is used.

Production control includes:

- 1) Slaughter number. The computer checks that every beast entering the plant leaves it.
- 2) Cooling waste (shrink) Computer checks cooling process and weight loss.
- 3) Salting waste for hides and skins. Manual.
- 4) Control for lard and tallow. Manual comparison of input and output weights.
- 5) Production control of offal plant (manual). This can be done by recording each "blow" i.e. each time material is blown to the plant, the batch weight is 600 kg. As only one batch can be blown at any one time, recording the number of "blows" gives a measure of input weight.
- 6) Production control of sausage casings (manual)
- 7) Dog food (manual + computer).
- 8) Plasma (manual).

Cutting Section

Carcasses awaiting cutting are temporarily held in a chill room adjacent to the cutting hall.

Carcasses for home production and SS are kept separate and cut in different parts of the cutting hall.

The carcasses are first "rough cut" with an electric circular saw. The joints are then placed on a rotating steel band which conveys the joints to the men for final trimming.

The SS retail cuts are conveyed by a closed loop overhead track to the packing area.

The meat is packed into cardboard boxes lined with plastic bags and then transported under the street to a special cold store. They are automatically sorted using a photocell.

KBS cuts about 6,000 pigs and 150 cattle per week. Most of products are delivered to Stockholm and Gästeborg by refrigerated lorries on the day of cutting.

The cutting department delivers the raw material to the sausage and canning sections. All the meat is standardized into different grades, according to water and fat content. The meat is minced and mixed in a 2.400 litre mixer. The water (or actually the fat) content is measured in a fat-content analyser, and if necessary, adjusted to the right water content.

The cutting section also packs about 5 tons of meat per week for immediate consumption.

They also process deepfrozen meat for catering. For that purpose, they have a butcher press, a breading machine and a freezer.

Operational data.

Foremen	7
Workers	106
No. of pigs/week	6,000
No. of cattle/week	150
Total weight produced/week (metric tons)	550
Average salary Sw.Cr.	17:50/hour

Examples of standardized meat/assortments

<u>Grade</u>	<u>Water</u>	<u>Fat</u>	<u>Protein</u>
Ox I	74	5	22
Ox II	70	10	20
Ox III	60	23	17,5
Pork I	70	10	19
Pork II	60	23,5	15,5
Fat without skin	20	74	6

Meat Emulsion Section

This section prepares all the meat emulsion for the sausage section. It also does the mincing and blending for the canning section.

The emulsions are prepared in a 500-litre rotary chopper. The chopper is programmed with different knife and bowl speeds for each product. The chopper mixes 360 - 400 kg in each batch. The emulsion is emptied into 200 l steel-trolleys and conveyed via a lift down to a chilling room in sausage section.

All necessary additives for the emulsions are brought ready weighed in sealed, plastic bags. In general, extracted spices on a salt or dextrose base are used. An 85 litre vacuum-copper is used. Meatballs, hamburgers, etc. are either minced or mixed in a mixer or chopped in a rotary chopper.

Operational data.

Foremen	2
Workers	4
Batches/week: emulsion	80
minced	20
Average salary Sw.Cr.	16:85

Lean beef and lean pork are not cured, being usually used fresh. Beef grade II is cured with nitrite salt 2%. Fat is usually salted with coarse sodium chloride 2% and is used chilled in emulsion type sausages. In most sausages 18 - 25% of fat is used. In the case of cheap sausages such as Lillkorv and Bräckkorv, red shoulder meat is used which is also cured with 2% nitrite salt (NaCl 99,4% and NaNO₂ 0.6%). Ascorbic acid is added towards the end of the chopping operation as a reducing agent for stabilizing the colour. It is added at the rate of 0,02%.

Head meat, diaphragm, heart, pigskin and skimmed milk are usually used in the manufacture of cheaper sausages. The pigskin when used is chopped separately in the chopper with 50% ice and 2% salt. It is used fresh and any residue finds its way to the rendering plant and is never used the following day.

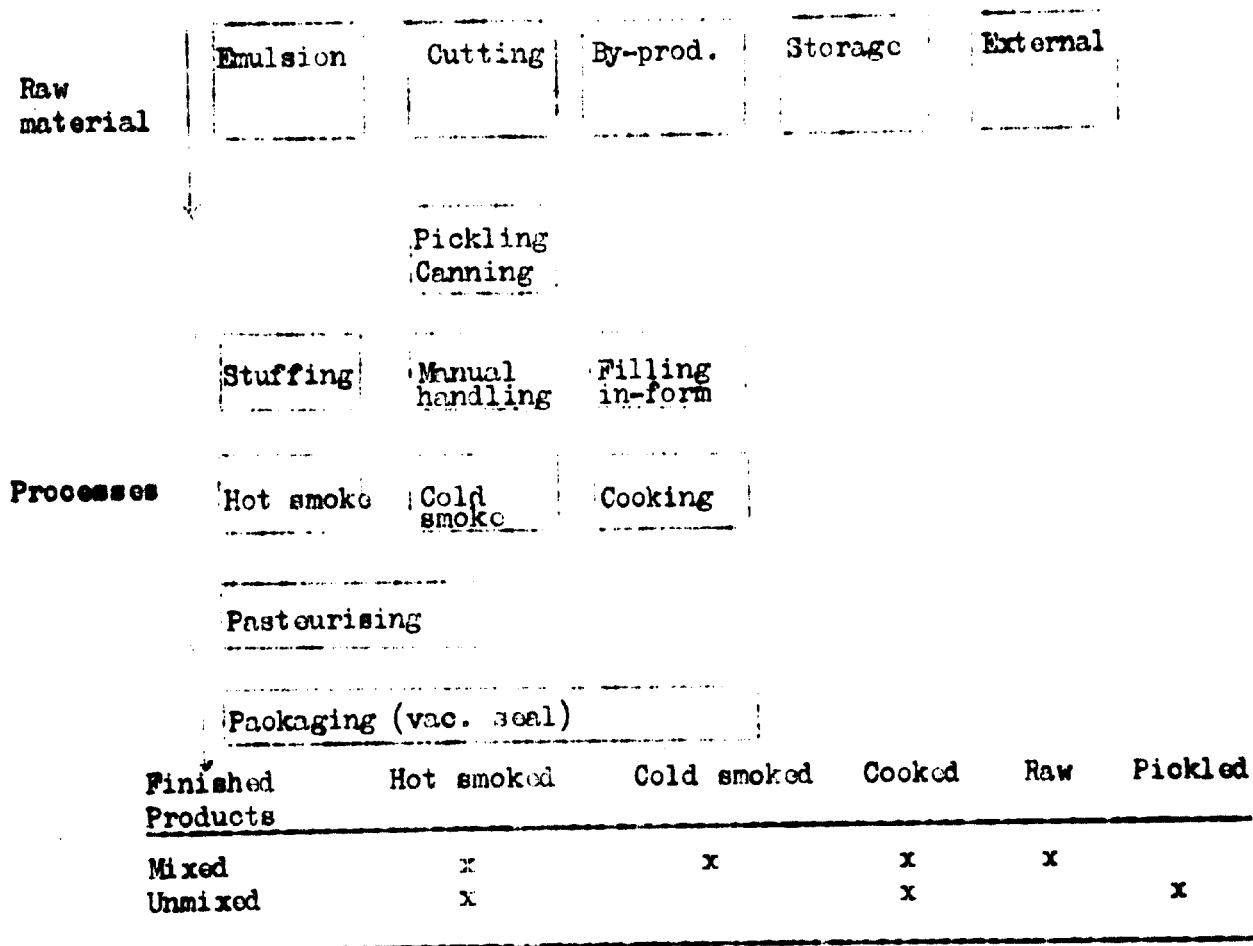
Permissible limits in respect of some of the additives in meat are given below:

Colours	-	not allowed in meat production
Nitrite	-	0,02 %
Nitrate	-	0,05 %
Potato flour	-	5 %
L-Ascorbic acid	-	0,2 g/kg
Citric acid (Sod. citrate)	-	1,5 g/kg
Dextrose	-	3 g/kg
Milk powder	-	10 % (must be declared)

Sausage Section

The sausage section handles about 90 products. The raw material comes either from emulsion section or cutting section.

Diagram 6



The brines are made in the cellar and stored at +4°C in large stainless steel tanks. The brine is then pumped to the pickle room on the second floor. Two pickle injectors are used to pickle 15 ton/week. Most of the products are kept in brine for three days before further handling.

For emulsion products KBS has four vacuum stuffers. Since in most food factories, production fluctuates, KBS also has two old air stuffers.

The average weekly sausage production is 50 tons. Most of the products are hot smoked. 8-10 tons are cold smoked in automatic smoking cabinets.

The products produced in the greatest quantities over the last few years have been Kassler (530.000 kg), Falukorv (222.000 kg) Gßingkorv (211.000 kg), Hotsmoked ham (Kasslerskinka, 206.000 kg) and Lillkorv (175.000 kg, knitted emulsion type sausage).

All pasteurized and cooked products must reach +72°C internal temperature.

About 40% (that is 35-40 per week) of the total production in the sausage section is packed at KBS. Five packing machines are working from 6 a.m. till 10 p.m. every day. Many products are sold both sliced/packed and whole. In order to minimize production costs, the products to be sliced are produced in different casings, e.g. hams, sold whole are stuffed in a 90/400 coloured casing and ham for slicing in a 90/700 uncoloured casing.

Two slicers are used to slice sausages and hams and a third one for bacon.

<u>Operational data:</u>	1972
Foremen	8
Workers	121
Production tons/week	90-105
No. of products	90
Customers (retail-stores)	650
No. of orders/week	1,500
Average production cost	100 Ore/kg
Average packaging cost	145 Ore/kg
Average salary Sw.Cr.	15:25 kr

Canning Section

The canning section produces canned food for human consumption. All their products are sold through a sales company on behalf of five canning factories within the SS.

Approximately 50 tons per week are produced. Most of the products are filled into normal cans, but three new filling lines were installed in 1971 for new "convenient cans", such as:

Easy open aluminium cans;
Aluminium foil containers; and
Aluminium foil bags.

The products are different types of meat balls and hamburgers. The minced and mixed meat comes from the emulsion section and is formed and fried in the canning section. There are two forming machines, whereafter the products fall directly into frying bath. Most filling work is manual. Sterilization is done in four autoclaves, one sample from each cook being taken for microbiological test.

At KBS the desirable F-value of all of the canned products is calculated, and products are sterilized on the basis of the findings thus made. This ensures safe sterilization of cans without subjecting them to greater temperatures and longer heating which spoils the products. The temperature of the

autoclave at which the canned products are to be sterilized is decided on the basis of experience.

All products are packed on trays and sealed with shrink polythene before they are loaded on European standard pallets.

Containers and cans are tested before they are used. Seams and seals are checked. Lacquer is tested, defects, such as spurs, wrinkles etc. are also tested.

Operational data:

Foremen	5
Workers	50
Average salary 1972	14:50 Sw. Cr.

The central kitchen

The central kitchen produces 22,000 hot meals every day. Of these, 20,000 are supplied to schools and 2,000 to industrial canteens.

The section also produces 6,000 "Formsal meals"/day, 3 days each week.

Equipment and staff: The "ready-meal" department is equipped as follows:

12 units 500 litre cooking vessels
2 " 300 " " " "
2 " 150 " " " " , steam heated
2 units steak tables
2 units frying machines
1 unit forming machine for hamburgers and meat balls

Capacity: 2,000 hamburgers/hour
10,000 meat balls/hour

4 units combined cooking - and frying cabinets

Capacity: 200 kg steaks - frying time 2 hours
200 kg fish - cooking time 55 min.

12 units conventional ovens
2 " slicing machines
1 unit mincing machine
1 " small whisk machine

2 units vegetable slicing machines
1 unit mincer (for some sorts of raw salads)
1 " husking machine for cabbage

Staff: The staff consists of 20 persons, plus the chief cook and foreman. Of these, 4 are part-time employees, i.e. working only

in the morning. The working staff is split up into four groups.

Group I consists of 4 cooks, who are in the cooking vessel area: in principle, they are responsible for all the food leaving the kitchen. They not only produce the food that is prepared (sauces, soups, stews, etc.), but they are also responsible for all the mixing and tasting carried out in the kitchen (e.g. preparing of chopped meat, which is later on taken over by the female staff at the frying machines).

Group II consists of female personnel at the automatic grill and the two frying machines with forming machine for hamburgers and meat balls. Further group II works with the oven and cooking cabinet. Frying operators are supervised by one of the cooks. Slicing of meats etc. is done by this group.

Group III consists, likewise, of female personnel and their first job in the morning is to mark transport containers that are to be used that day. They fasten canteen address cards, received from the planning department on every container. Then they weigh out vegetables, mustard, pickled cucumber, etc. i.e. the additional ingredients.

Group IV, vegetable department, cooks potatoes and prepares salads etc. during the morning. Then vegetables that are going to be used in the processing the following day, are cleaned and prepared. Furthermore, all potatoes and other vegetables for use in the meat products and canning processing are cooked in this department.

Planning: The menus are based on a nine week repeated schedule incorporating 45 different meals. Various popular meals, such as pea soup and brown beans are repeated within the schedule. The menus are also adjusted to suit the availability of fresh products, e.g. cabbage in autumn and fresh vegetables in spring. Two different types of menus are followed - one for schools and one for industrial canteens. The portions vary in size according to the category of the consumer, industrial portions being bigger than school portions (the age of school pupils influence the size of the school portions).

For effective machine utilization, the five main courses of the week are produced every day, tied in with delivery routing, so that approximately the same amount of portions of each meal are produced. Twice a year, the route chief together with the transport leader visits the customer areas to get an idea of the following six months' demands, and routing proposals are then processed by the planning department.

One month before the beginning of each period a new nine-week menu is worked out. All menus are compared from a food value point of view and based on the standards of calorie-vitamin value prepared by the Board of Education and the National Institute of Public Health. Likewise the planning

department calculates, from experience, the estimated consumed portions for each customer per day and settles the machine personnel schedules for the menu. During the period, the estimated raw material consumption is indicated one week in advance to the Kitchen Chief for the coming week. Information about the final portion totals for the next day, is passed on to the Kitchen Chief an afternoon in advance. The planning department also calculates the exact size of each meal for each customer.

Working routine: In order to be able to produce the meals in the relatively short time available - owing to the early departure of the first deliveries, the schools normally have their meal times at around 10.30 - 11 00 - and in keeping with the principle of having all the meals freshly made, great attention must be paid to the preparation jobs the day before. So, for example, meat is fried and sliced, sausage is sliced, meat pre-braised, meals are roasted, chopped meat is mixed, vegetables are cleaned, trimmed and so on.

When the staff arrives in the morning, every group receives an exact order list for the products to be processed, how much of each kind and by what routes the meals are to be distributed. One of the staff immediately goes down to the transport containers store and starts marking the containers with address-cards received the previous day from the planning department. These cards indicate the size of the containers, the kind of food, quantity, and name and address of the customer. The containers are placed on pallets and sorted according to the type of food and route, the pallet is then later on taken to the kitchen by a special container lift. The pallets are then distributed to the different processing stations. Charging must take place as quickly as possible and as late as possible before departure, in order to avoid heat losses.

In some cases continuous charging is possible, from frying machine and grill/cooking automats, where the food passes direct from machine to container. After charging the container, the pallets are collected in accordance with the routes and taken to the loading platform at specified departure times.

When the last departures have taken place, "ready meals" for shops are processed and at the end of the day the next day's work is prepared as already described. The working scheme is the same the whole day for the different groups. A check is made to ensure that all products ordered actually arrive.

Raw materials are ordered one week in advance according to the previously calculated list received from planning department. Meat is ordered from the cutting department, cured meat from the meat products department, remaining products are ordered via the purchase department from different suppliers. The kitchen department has four chill-rooms at its disposal, divided in such

a way that the real kitchen uses one for raw products and one for cleansed vegetables. Raw materials are stored for a maximum of five days. Deep-frozen products are ordered in large quantities and are kept in one common cold store. Dry products, flour, salt, sugar, spices etc. - are taken a couple of times a week from a likewise common store for all departments.

<u>Costs:</u>	<u>Sv. Cr.</u>
Raw material	1,--
Milk, bread and butter	1,--
Production costs	0,15
Transportation	0,15
Service	0,25
Administration	0,10
Tax	0,50
Profit	0,10
<hr/>	
Total cost	3,25
	=====

Sanitation and hygiene at KBS

Good plant sanitation and hygiene is a current requirement and cannot be overlooked. It is essential that quality products be produced free from contamination and adulteration so as to prevent food-borne illnesses or food poisoning, which can pose a health hazard .

In order to exercise effective sanitary control, it is considered essential to observe procedures for cleaning and maintenance of equipment, personal hygiene, preslaughter, care of meat animals, environmental sanitation, sanitary designing of abattoir, in-plant sanitation i.e. wall, floor, fixtures, etc., disposal of waste and handling of meat when it reaches the consumer.

The KBS slaughter house is very well designed and sufficient care has been taken to separate clean and unclean operations.

The lairage and killing floor is located on the ground level and chutes have been provided in the slaughter hall through which inedible portions of the carcass are directed to various sections for further processing and disposal. Sufficient washing, flushing and disinfecting facilities have been provided to clean frequently the equipment and hands in slaughter hall.

The slaughter hall and the equipment installed therein are washed, cleaned and disinfected every day after the day's work is over.

The design of this meat plant also provides for an efficient and sanitary flow of the carcass and the work. The unclean departments are located at ground level, the waste and undesirable

portions of the carcass and other inedible products not fit for human consumption are blown directly to the rendering plant.

The floors are hard, impervious, easily cleaned and properly drained.

The walls in most of the rooms are lined with glazed tiles which have hard, smooth surfaces and are easily washable. Care has been taken to provide other sanitary facilities such as modern lavatories, locker rooms, water supply, ventilation, proper artificial light, clean dresses, washing and disinfection requisites, showers, eating and resting places for the workers.

The drainage for the effluent from the plant and lavatories are separate. The waste water from the lavatories is tied up with the municipal sewage systems whereas the effluent is drained off into large tanks whence it is transported to the fields for manuring.

Sanitation and hygiene control are entrusted to a sanitary section which works with a special team of workers employed solely for this purpose.

It has been thought that production workers who are tired at the end of the working day and eager to reach home cannot exercise the adequate care needed for thorough cleaning and disinfection. Moreover, if the same workers are required to effect cleanliness, production has to be stopped, thus resulting in low production turnover and a drop in efficiency. Since its establishment, the sanitary section has been entrusted with many sections, but some sections, e.g. cannery, are responsible for their own sanitation and hygiene.

The sanitary section is responsible for the distribution of utensils, cleaning of floors and walls as well as the cleaning of most of the machines. They also handle the storage and exchange of working clothes.

Operational data:

Foremen	3	
Workers	35 (11 full shift, the rest part time workers)	
Total cleaning area	17,000 m ²	
Total cleaning time	830 hours/week	
Number of dishes washed:	throughs	per day 1,000
	trolleys	" " 350
	insulated containers	" 800
Costs for working clothes per year		450,000 Sw.Cr.
Costs for detergent clothes per year		120,000 Sw.Cr.
Total sanitation costs	per year	1,500,000 Sw.Cr.

Routine sanitary and hygiene practices in KBS (Cutting Hall).

<u>S.No.</u>	<u>Object</u>	<u>Frequency</u>	<u>Method employed</u>	<u>Detergent</u>	<u>Dis- infectant</u>
1	Floors	(i) at tea-breaks and at the end of the day (ii) every other (iii) alternate days	Hot water and steam special washing and cleaning machine jet cleaner	--- P-3 floating special ---	--- --- ---
2	Walls	once a day after work is finished	pressure steam cleaner	P-3	---
3	Chutes	every day after work	hot water and steam	P-3	---
4	Machines	at the end of day's work	washed, scrub- bed cleaned, disinfected. High pressure steam cleaner	M-6	0,25%
5	Weighing machine	once a week	washed and cl. with hot water and steam	M-6	---
6	Overhead track	fortnightly	washed and cl. with hot water and steam and greased	---	---
7	Hooks etc.	every time after use	washing and cleaning with water and steam	M-6	---
8	Steel con- tainers, steel utensils	frequently	washed and cl. with hot water and steel	P-3	---
9	Chinaware mirrors, waste paper baskets + ashtrays	every day	washed and cleaned	P-3	---
10	Dispatch areas	every day	Do.	P-3	---
11	Cold rooms (walls and floors)	every day	washed and cleaned with high press. steam cleaner	---	---

N.B.

- a) Gratings placed at the entrance and on the outflows are washed and cleaned on both sides every day.
- b) Soiled knives in the cutting hall are washed and disinfected by dipping in alcohol and burning.
- c) Stock of toilet papers, handkerchiefs, drinking cups, hand disinfectants, detergents and hand cream are replaced every day in the afternoon.
- d) Surroundings are kept clean. Parking place has been provided outside the factory premises to prevent air pollution with smoke and dust.

To maintain an effective control of sanitation and hygienic practices, the quality control section of KBS conducts periodic inspections and investigates the extent of microflora on different floors. The standard of hygiene observed at KBS is given below:

<u>No. of colonies per 25 m2 plate</u>	<u>Observation</u>
0-150	Good sanitation
151-300	Average sanitation
over -300	Bad sanitation

Routine of personal hygiene followed at KBS

- 1) Through medical check-up of all the new entrants.
- 2) Subsequent health check-up once a year.
- 3) Any employees visiting foreign countries (other than Scandinavian countries) are re-examined for salmonella upon return.
- 4) KBS arranges periodic courses in personal hygiene for the workers twice a year.

The quality control system.

The base of the control quality system at KBS is the veterinary control. All animals slaughtered at KBS are stamped with No. 80, which is the KBS control number, and with the veterinary's number. Pigs are also stamped TU.

These three stamps tell that the animal can be used for human consumption (TU relates to the trichinella test). A modern factory like KBS cannot stop there: the control system is supported by a adulteratory, bacteriological laboratory, a test kitchen, product and process controllers.

Products sold under the Scan-name are tested 6 -12 times a year by the Swedish Meat Research Centre.

All external raw material is checked on arrival at KBS. Specified bacteriological limits are given and no section is allowed to use any material before clearance is obtained from the control section.

The Swedish food regulations have limits for water content, fat content in special products, and these products are tested regularly.

The control section helps the process controllers in the factories with journals and special tests e.g. shelf-life test, taste panels,

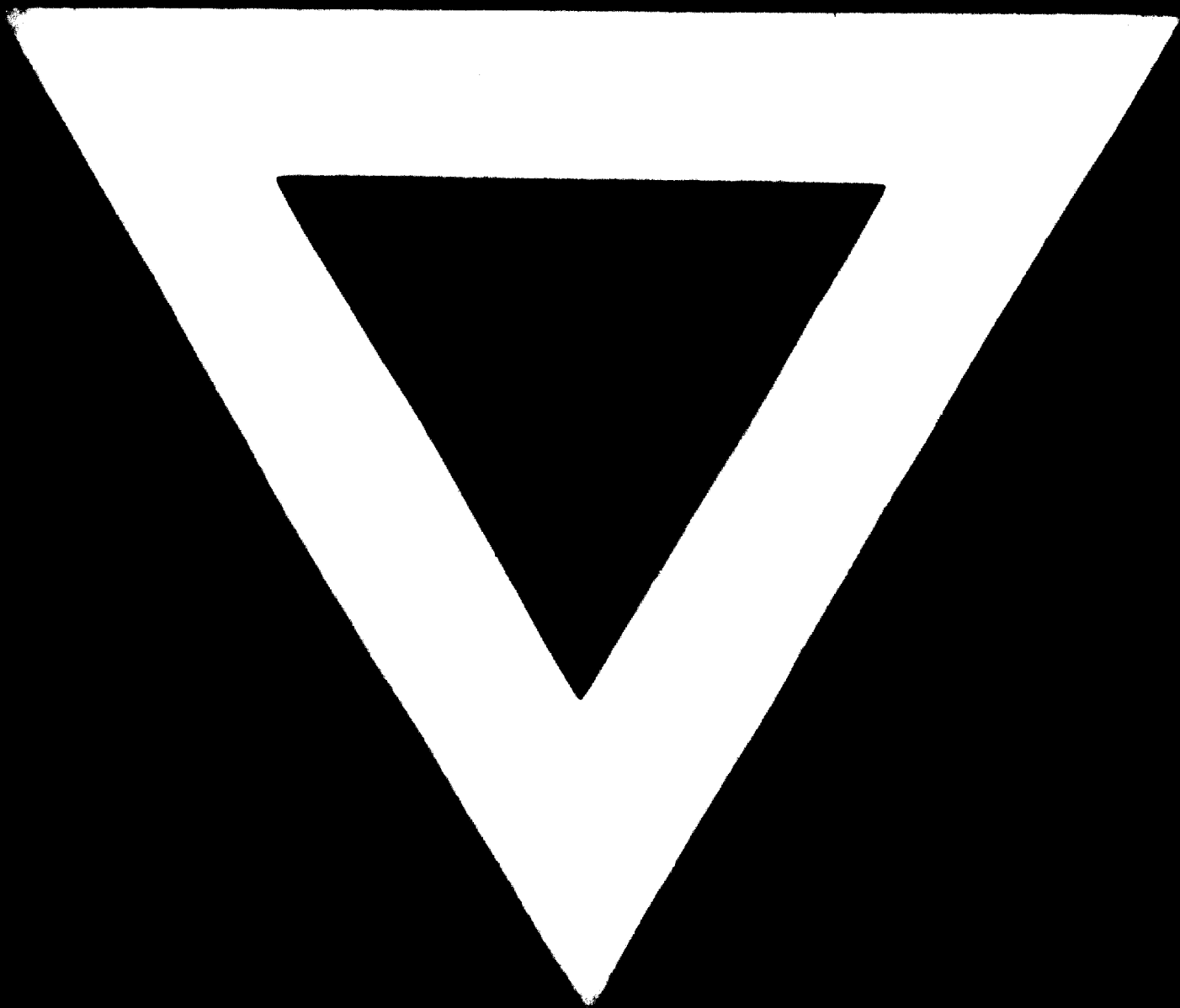
Operational data:

Analysis made by chemical laboratory 1970

Water content	4,654
Fat content	1,169
Protein content	920
Ashes	411
NaCl	211
Active chlorine	13
NO ₂	4
NO ₃	5
FFA	861
pH	1,843
Peroxid	861
DH (German degrees of hardness)	3,077
Phosphate	488
NaOH	493
Bact. analysis (canned products)	7,000
Bact. analysis (raw materials)	7,000
Bact. analysis, water	

Employees:

Veterinary surgeons	6
Veterinary technicians	8
Working chemists	9
Process controllers	3
Product controller	1



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