On 1st September, 1960, a party of some 70 members of the Society of Dairy Technology left Liverpool Street Station, London, on the first stage of a Work Study Tour of the Netherlands that was to last until the 9th September. The party was led by the President of the Society, Mr. Ridley Rowling, assisted by the Secretary, Mike Sonne, with Bob Martin acting as Liaison Officer with the Dutch Authorities.

The journey from Harwich to the Hook of Holland on board the M.S. "Königin Wilhelmina" gave the members of the party their first opportunity of meeting and talking to each other, but a heavy lunch and the roll of a boat only six months old, but without stabilisers, resulted in a number of the introductions consisting only of a tight lipped nod of the head.

As the "Wilhelmina" crept into the Hook of Holland there came a sound which became very common during the next 9 days, the clicking of camera shutters and the whine of cine film rushing past the lens. Then down the gang-plank for the party to be introduced to the two guides William and Albert loaned by the Netherlands Railways. The party were then to try the first Dutch train and in the dying light get its first glimpse of the lowland countryside as the train travelled smoothly by Rotterdam to Amsterdam Central Station.

After the luggage had been deposited in well labelled piles the party were led out in a lengthy crocodile towards the restaurant De Beursbengel. This restaurant situated in the most famous street in Amsterdam called the Damrekk. The first sight of the party shocked the Dutchmen to the core, for it burst from the station and with total disregard for the traffic regulations of any European, Asiatic or American country threaded its way across the main streets on route for its first Continental meal. During this meal the party were issued with a card allowing them to travel on the Amsterdam tramsw without payment, they were briefed with details of the tour and were staggered to learn that there was a very definite accent on the work part of the tour and that breakfast at the various hotels would be rarely later than 7 o'clock in the morning. On Friday morning at 7 o'clock we sampled our first Dutch breakfast, a meal that was standard at all four hotels used by the Society of Dairy Technology in Amsterdam and consisting of cold hard boiled eggs, cold ham, Salami sausages, rye bread, rolls, fruit bread and a toasted form of biscuit with whey butter and jam. By 8.15, the party, having assembled at the Central Station, were on the express train for Gouda. Swearing silently, and not so silently, that in future when one came down to breakfast coats, cameras and containers of cosmetics would be brought down at the same time, thus avoiding the strenuous climb up the precipitous stairs common in all Dutch multi-story buildings. On the journey to Gouda we experienced the real service of the Netherlands Railways, not state owned. First-rate coffee was brought round in paper beakers and the excellence of the post-war track laying could be assessed by the fact that the coffee remained in the beaker with scarcely a ripple even though the train was cruising at some 80 miles per hour.
At Gouda a visit was paid to the De Producent Dairy Factory. It is Europe's most modern cheese store and the world's largest Gouda cheese store with the actual store a masterpiece of automation sealed from the external climatic conditions.

After a delightful lunch in the town of Gouda with a rapid glance at the old town with its Town Hall, Weigh House and Mint House, each locality in Holland had its own currency in the Middle Ages, we visited the farm of Mr. P. Streefland at Lekkerkerk. This was a typical Dutch farm and cheese dairy situated on the banks of the Rhine with the farmhouse some 20 to 30 feet below the river level on the landward bank of course. Mr. Streefland assured the members that he had not learned English at school but merely by listening to the B.B.C. and we were left wondering if we had farmers in England capable of dealing with a barrage of questions in a foreign language. The farm of some 50 acres with his herd of 30 fresians giving 1,150 gallons per lactation followed the normal Dutch pattern with the cows bedded down from November to March and out at grass from May to October, during which period the cow byre is used for cheese making. The cow byre in the Netherlands is worth mentioning structurally for it differs a great deal from the conventional ones in Great Britain. Many of the byres are double range with cows head to head and a central feeding passage. Over this feeding passage there is a trapped door to the loft where the winter's supply of fodder is kept. The standings have a recessed portion at the front and this is filled with peat and help to avoid knee trouble during the long period that the cows are housed indoors.

The channel is frequently only 18ins. wide and some 2ft. deep and very steeply sloped the length of the byre. Above this channel there is a rod and by means of a string the tail of the cow is tied to this rod in such a way that the cows tail is elevated from the floor whenever the cow lies down, thus preventing the soiling of the tail. Although there is a considerable amount of wood in the structure of the cow byre the standards of hygiene is such that all woodwork is kept scrubbed until it is bleach white. All achieved by scrubbing brushes, soda and elbow grease without the assistance of any proprietary detergents. The labour force on this farm is made up of the family, the farmer, his wife, one son and two daughters. It was interesting to realise that the sons of Dutch farmers are expected to marry Dutch girls who will be competent cheese makers and competent producers of further generations.

When we returned to our evening rendezvous in Amsterdam we had the pleasure of a short talk by Mr. Ing. Tiersma, a member of the Netherlands Ministry of Agriculture, and he gave a most helpful address on the various places that we were to see during the tour.

On Saturday morning the party set off for Aalsmeer which is known as the flower shop of the world. On the morning of our visit the normal auction had been replaced by a parade of flowers. This consisted of cars and many commercial vehicles daily decorated with the most intricate floral designs of many colours and varieties. It was noticed that at this time of the year the
majority of the floral decoration was done with various types of Dahlia. A
great deal of originality had been shown by the various flower growers and the
mobile exhibits varied from a 25ft. space rocket completely made of small
pom-pom type Dahlias to an enormous globe showing the various countries of the
world picked out in different colours and surrounded by small girls representing
each of the major nations of the world. During the morning we also visited a
clog maker at Bovenkerk where we saw not only clogs being made for normal use by
the Dutch land workers but also many clogs being made as miniature souveniers
for the tourist who was more than willing to reimburse the clog maker at a very
high price.

During the afternoon we paid a visit to a cheese making farm at Broek
where many members were so misled as to buy small factory made Gouda cheese
in the belief that these particular cheeses had actually been made on the farm.
We later paid a visit to the fishing village of Volendam where most of the
inhabitants still wear the Dutch national costume for no other reason than
providing entertainment for the tourists.

On Sunday morning, joining the more active members of the party, we journeyed
to Rotterdam and from the Spido we made a boat trip of the harbour of Rotterdam.
This is the largest harbour in Europe and is the second largest harbour in the
world. It was interesting to note how many British boats were being repaired
in the shipyards and we were assured that this was merely because the Dutch
shipyards adhered to their delivery dates. After lunching in a restaurant in
the very modern shopping centre of Rotterdam, a centre which is devoted entirely
to shopping by pedestrians and no cars are allowed. We visited the
International Horticultural Exhibition, The Floriade. This was a wonderful
exhibition with representatives from most of the European countries and even
some from South Africa and America. One was left with the thought that the
people in England who are responsible for our major shows could have learned a
great deal by merely examining the way in which this exhibition was laid out to
enable all people to see with ease and comfort every exhibit. The exhibition
itself was dominated by the structure known as the Euromast. This is a tower
some 400 ft. in height overlooking the entire exhibition and the harbour of
Rotterdam with a very silent and swiftly moving lift taking tourists from the
ground floor through to a restaurant 400ft. above ground level in 11 seconds and
where having looked over Rotterdam they can enjoy the highest tea in the
Netherlands.

On Monday morning we travelled to Hilversum for the purpose of visiting the
V.G.M. Creamery. This is a most modern creamery beautifully laid out in the
country and so constructed as to ensure that none of the residential houses
nearby are troubled by noise.
Visit to V.G.M., Hilversum

After lunching in Utrecht we visited the 50 acre experimental farm at Zegweld. It was highly stocked with 40 cows, 12 heifers, 16 calves and nearly 200 pigs in addition to a high compliment of poultry and even rabbits. This visit was probably the most disappointing part of the whole tour.

After this visit we travelled back to Hilversum to visit the Polak and Schwarz factory who are now better known as International Flavours and Fragrances Ltd. At the factory small groups were taken on a conducted tour round the Analytical and Factory Control Laboratories, the various distillation plants, the Vanillin Factory and the Polvarmos Plant.

Later that night, having returned to Amsterdam, I.F.F. invited the party to a Dutch Borrel. This is an informal Cocktail Party at which both speed of consumption and quantity of consumption are major issues.

The following morning the party travelled to Ede for the purpose of visiting the Netherlands Institute of Dairying. This is a very fine and modern Institute.

Visit to Netherlands Institute of Dairying at Ede

Following the visit to the Institute there was a coach tour to the beautiful surroundings of Arnhem with a visit to the Airborne Memorial and Airborne Cemetery at Oosterbeek. The sight of some 2,000 graves beautifully laid out in long lines, each of which had its own small rose bush beautifully looked after by the young people of Arnhem, had the most marked effect on the whole party and it was indeed strange how many of the party had some relation or friend lying at Oosterbeek among the fallen.

After leaving the cemetery we toured the magnificent Nederlands Openluchtmuseum (Open Air State Museum for Folk Lore). This museum features farmhouses, windmills and rural industries, set in this national park in their natural environment and shows the development of each of these parts of Dutch folk lore through the last 500 years. It was extremely interesting to note that the modern farms on the newly recovered lands of Holland had varied very little in conception since the 16th century.

The following day we travelled to Blokzijl with its narrow streets and very sharp bends to visit the Novac Cheese Factory which has a total intake of milk of some 21 million kilogrammes per year. At the time of our visit this factory was in the process of making Gouda Cheese and once again it was impressed upon us the absolute necessity of paying scrupulous attention to hygiene. After leaving Novac we were taken to the hotel Voorhuys in Emmeloord. This is known as the hotel at the bottom of the sea for the obvious reason that only a few years ago this particular town was below sea level. This is part of the new north-east polder. Our afternoon visit was to the farm of Mr. A. J. Benedictus at Zwatemweeg. This farm is one of the standard farms rented from the Government on the newly recovered polder. The farmsteads are built to a standard all purpose design and although milk plays a very great part
in the husbandry it is designed to allow for arable work as well as milk farming. The farm itself looked extremely prosperous and was obviously very well designed.

Having carefully examined the farm of Mr. Benedictus we travelled to Giethoorn known as the little Venice of the north. This is an extremely interesting village in that the houses are built on very small areas of dry ground surrounded completely by water. There are no streets whatsoever and contacts between house and house and house and farm buildings are by low wooden bridges. All transport is by boat and the few fields that exist are heavily stocked with cattle which are now used to strip grazing. The cattle are moved from grazing strip to grazing strip by water and milk is transported by boat right up to the factory where the churns reach their destination by conveyor belt built over the water into the factory.

That night was spent in Leeuwarden and that was our only night away from Amsterdam. The following morning we visited F.R.I.C.O., this stands for Friesian Co-operative Dairy Produce Exporting Company. It has over 50 dairy factories in Friesland under affiliation and its main function is that of sales promotion and distribution. It has 200 representatives in various parts of the world and exports cheese and other products over 70 countries. As a group it receives 600 million kilogrammes of milk per year and handles over 42 million kilogrammes of cheese annually.

Our return journey to Amsterdam was via the Enclosing Dam of the Wieringermeerpolder visiting on the way the Reclamation Information Centre at Den Oever where we met one of the engineers who had been responsible for this most formidable dyke which is some 30 miles long and some 280 feet in width. It is a fantastic piece of engineering and one cannot help but be thrilled by the sight of the North Sea stretching away on the one side and the calm waters of the Zuyder Zee on the other. During the war this dyke was blown up in two places to help stem the German advance and this polder of 50,000 acres was entirely inundated in two days.

After tea at Middenmeer one of the villages on the Wieringermeerpolder we travelled to Alkmaar which has been famous since the Middle Ages for its butter and cheese market and then by train back to Amsterdam for our final get together celebration dinner.

All too quickly came Friday, 9th September, and we were on the boat train from Amsterdam to the Hook of Holland and on to the boat back to Harwich to enjoy a very good lunch and to have time to sit and reflect upon some of the things that we had seen during the previous very exhausting days. Some of the things that impressed us all were the outstanding hospitality granted to us by both the farmers and the dairymen that we met during our tour. At each dairy we were taken into a central reception room provided with coffee, cigarettes for the ladies and cigars for the men and almost invariably in this Reception Hall was an illuminated plan of the dairy premises showing by means of coloured lights the inflow of milk and the outflow of the milk products.
This is an idea which we could very well extend to some of our dairy premises in this country. It was also noticeable that whether on farm or in dairy we were greeted in our own language and all the questions were answered in the same language even though some of them were highly technical. One was left wondering how many farmers and dairymen in Britain would be capable of answering questions in Dutch, German, French or Italian.

I think most of us were impressed by the general cleanliness of Holland not only in the buildings but in their streets and it was rare that one saw any rubbish lying around in the streets, and if there was any at all it was almost invariably deposited by tourists and not by the natives. We were also impressed by the attitude of the Dutch to work. It transpired that very few of their farms were owner occupied and all farms in the polders were State owned and there was a very heavy competition for every farm that became available. There were no large farms as we understand large farms in this country and it was indeed rare to find one of more than 100 acres. In the new polders most of the farms are in units corresponding to 20, 40 and 60 acre plots. The buildings on all these farms are standardized and have been very carefully considered. Their planning leaves nothing to be desired. We learned that milk from these farms is collected twice a day during the summer months and that the standard price of some 2/8d. per gallon is paid throughout the year. It was noticeable to these people that drank milk that it was not quite the same standard as we enjoy in this country for the very reason that all milk for the liquid market is standardized to some 2.2 to 2.5 per cent butter fat. All excess butter fat, and it appeared that the general average for butter fat in the Netherlands was over 4 per cent fat, was removed for manufacture. At the end of the year each farmer is paid a bonus for the amount of butter fat above the standardized figure.

Most of the party that had any connection with the dairy trade in this country were most impressed by the efficiency of the Dutch dairies and the enormous number of products that came out from any milk factory. To name but a few there was the conventional Dutch cheeses, butter, pasteurised milk, separated milk, sterilised milk or bottled, rice pudding which was bottled, custards in various flavours, milk drinks in various flavours and even whey from the cheese was pasteurised, bottled and sold, and often exported to Germany. It seemed that many of the dairies produced at least 17 milk products.

On every farm that we visited we were extremely impressed by the high standard of hygiene. It was noted that no farmer cooled his milk, and indeed in Holland there is the view that milk which is uncooled will reach the dairy in a better condition than that which has gone over a cooler difficult to wash and sterilise. During the time that we were visiting Dutch farms all milking was carried out of doors by a most peculiar milking system consisting of a milking machine engine, a set or low cart with a vacuum line round three sides of the long low cart with the animals often 20 at a time facing in to the cart. At the edge of the strip of grass where milking was being carried out there was a stone table on which lay the billy cans and sips for the cows.
boat and a sile sitting on top of the churn. Milking in the main was by bucket plant and the buckets milk carried across to the boat and sile directly into the churn and then in many cases taken by boat directly to a factory or a central collecting area.

Finally it must be recorded that this trip to Holland was very much a Work Study Tour and some of the older members of the party had a certain amount of difficulty in trying to maintain the pace. Nevertheless, this the first tour of its type carried out by the Society of Dairy Technology was an immense success and no one in the party whether directly connected with the milk industry or not failed to be impressed by what they had seen and learned during this very exciting but exhausting time.
Europe's Largest and Most Up-to-Date Cheese Warehouse

A cheese warehouse is practically always a building of several storeys with small windows for regulating the ventilation, while at the same time they prevent the admission of too much sunlight. Long racks, loaded and empty lorries and a number of people in a comparatively gloomy building form the picture visitors carry with them when they leave the cheese warehouse.

The internal transport in such a warehouse is uneconomical. Many hours are lost due to the time it takes before the empty, unloaded lorries can be refilled again. The storage capacity, especially when the turnover is considerable, often jeopardizes a prompt execution of the orders.

When the management of the dairy-co-operative "DE PRODUCENT" at Gouda (Holland) had decided to extend their storage capacity they carried out a plan after due consideration and profound research, which is so far unequalled in Europe.

The new warehouse is completely shut off from the open air. Temperature, air and moisture are controlled by means of an ingenious air circulation system, in which perforated ceilings and floors play an important part. In this way every conceivable climate can be created.

In seeking a solution of the problem to make the internal transport more rational, quite a revolutionary way of transport was developed after much consultation. A system or corrosion-proof conveyor belts with a total length of more than 3,271 yds. has provided an efficient and smooth-functioning solution of the transport problem. This system makes it possible to save as much as 60 per cent in manpower. The conveyor belt leads along cheese racks with a total shelf length of 78,804 yds. and a storage capacity of 1,771 tons.

Three motor trucks, each carrying 11 1/2 tons cheese can be discharged simultaneously. By weighing before and after the discharge the quantity of cheese is determined accurately, while the number of cheeses is recorded by means of a mechanism mounted over the belt conveyor.

The problem of lost hours has been solved, the adverse effects of air, light and moisture have been eliminated, and with an ultra-modern warehouse at their disposal the Netherlands dairy industry can supply foreign buyers any quantity at any time.

Gouda is the centre of a famous cheese-district. The farmers used to make cheese on the farms, as is still done on many farms, and sold the cheese to private traders.

During the first World War, the merchants stopped buying the cheese because of anticipated extra risks which, however, never materialised. As a consequence, the farm-houses were filled with home-made cheese. This was the reason why some farmers set up a marketing co-operative. This co-operative started in 1915 with 33 members, which increased in a few years to more than 500.

To get a foothold in the market, the society had to sell other sorts of cheese, which were manufactured in neighbouring co-operative dairy factories. Eventually a specialised society was formed with several co-operative dairy factories as members. This special society is incorporated in the framework of the original marketing society (see below).

Cattle-Fodder Department.

Often the private buyer of cheese was at the same time a dealer in cattle-fodder. Farmers with financial difficulties could get credit from the dealer, who paid the farmer for his cheese and paid a commission to the farmer on the basis of the weight of the cheese. As a result of the present situation, the co-operative has set up a department for selling and distributing cattle-fodder.
Both departments are constituted as separate but not independent co-operatives. Each has its own members, board of directors, by-laws, administration etc. The two co-operatives are, however, headed by one general board of directors and have one manager who is responsible for the two departments.

**Bank Department.**

The co-operative has a special department, under the supervision of the general board, where the farmers can deposit their savings. They receive a reasonable interest. Part of this money can be used for investments of the various departments.

**Egg Department.**

A co-operative egg auction in the working area of "De Producent" got into difficulties. It therefore joined "De Producent", again as a separate department. The latter had an efficient sales-organisation at its disposal. By doing this, the egg co-operative can give better service to its members and obtain better financial results.

**Factory-cheese Department.**

As "De Producent" was selling more and more factory-produced cheese it became necessary to unite the dairy factories which delivered the cheese to "De Producent" in a separate co-operative within the framework of "De Producent" specially for the marketing of their cheese. The marketing of cheese demands special storage, care and skill which can best be found in a specialised organisation.

Moreover in the cheese trade it is necessary to handle all kinds of cheese, which is impossible for the various dairy factories.

This department now has a yearly turnover of 19,481 tons Dutch cheese.

**Milk Department.**

During the second world war there was a danger that cheese-making on the farm would be prohibited and that all milk would have to be delivered to dairy factories.

The general board therefore decided to start their own dairy-factory to be able to receive the milk of the members.

After the war the milk-supply was still increasing so that a new factory was built outside Gouda, which could produce cheese, butter and milk-powder and other milk-products. For the marketing of the cheese this Department is a member of the Factory-cheese Department.

In another part of the working area the Department has a second dairy factory.

The total capacity of this department is 44,782 to 49,000 tons of milk yearly. Part of the milk is pasteurised for direct consumption, the rest being processed into non-perishable by-products.

**Book-keeping Department.**

For the benefit of the members there is a special department, which can take care of the book-keeping of the member-farmers of cost price and give advice on taxation problems.

- For all Departments the leading principle is that they work for the benefit of the members of the Department.
- The members have unlimited liability for the Department of which they are members.
- Every Department has its own board of directors elected by the general
Every board of a Department has some representatives in the general board. The general board co-ordinates the activities of the various Departments and can impose its veto upon the decisions of the boards of the various Departments, if they interfere with the interests of other Departments or with the interests of "De Producent" as a whole. The general board cannot make binding regulations but can only advise. The general board manages the activities of the Bank Department and the Transport Department, which organises all the transport of the Department by its own trucks.

The board of supervision is elected by and from among the members. The board has the right to control all activities of the Co-operative and its Departments. The board reports its findings to the general meeting. The general board appoints a general manager who is responsible to the general board for the management of all Departments. The management of the Departments is entrusted to departmental managers, who work under the supervision of the general manager.

The working area of the farmer-cheese, the milk-, the egg- and the cattle-fodder Departments is in the environs of Gouda, 20 km south and 35 km north of the town. The members of the Factory-cheese Department are mostly in the central districts of the country.
Notes on the "Verenigde Gooise Melkbedrijven" (V.G.M.), Hilversum.

The factory of the V.G.M. is one of the most beautiful milk factories in Holland and the layout and equipment the most modern.

Before this factory was completed the V.G.M. had three factories - in addition a powerful co-operative milk marketing society also had a factory in the same area; this latter plant being known as the C.M.C. In 1951 the two organisations amalgamated and the C.M.C. closed its factory and the milk was diverted into the V.G.M. plant - the C.M.C. organisation also gained representation on the Board of V.G.M.

The three existing factories were out of date and could not supply the demand for "drink milk" - after the merger plans were made to build a plant capable of handling 9,900,000 gallons of milk for liquid and for manufacture. In 1957 the new factory opened and the three existing factories closed down during the same year.

The new factory has two wings with a central hall 52ft. long. The frontage of the new building is 330ft. long and 217ft. in depth. In the left wing is situated the administration section, milk reception, churn washing etc. In the other wing you will find the manufacturing sections, laboratories, canteen, visitors reception and the cool storage.

The centre section is used for outgoing products.

The milk intake is semi automatic and 4,450 gallons per hour can be accommodated - 20,000 bottles can be washed per hour whilst four other machines fill and cap a similar number.

The milk products department has equipment to process a capacity of 3,550 gallons per hour.

Milk storage will accommodate 2,220 gallons in each of 24 tanks whilst in addition there is a capacity of 15,540 gallons for sour products.
The institute consists of a modern laboratory and an experimental factory.

The building of the laboratory started in August 1952. It was finished during 1954. The building of the experimental factory took place between April 1953 and May 1955.

The N.I.Z.O. was officially inaugurated on June 2nd 1955 by the Minister of Agriculture, Fisheries and Food.

The financial aspect

About half of the cost of the buildings and equipment were provided by the Government and the rest of the money was obtained from the industry by means of a levy on milk.

The working expenses are covered by annual subsidies from the dairy organisations. Most of this money, however, is acquired by means of a subsidy from the semi-governmental institution, which imposes a levy on all the milk handled by factories and cheese-making farmers. The N.I.Z.O. also derives an income from work carried out on behalf of dairy equipment and instrument-manufacturers.

Board and Direction

The Board of the institute consists of the following members:

Three members, appointed by the co-operative dairy organisation, the "Koninklijke Nederlandse Zuivelbond (F.N.Z.)";

two members, appointed by the private dairy organisation, the "Vereeniging voor Zuivelindustrie en Melkhygiëne (V.V.Z.M.)";

one member, appointed by the organisation of cheese-making farmers, the "Bond van Kasproducenten";

one member, appointed by the central organisation of the dairy organisations mentioned above, the "Centrale Zuivelcommissie";

one member, appointed by the Dairy Board;

one member, appointed by the Minister of Agriculture.

With this structure of the Board, the whole Dutch dairy industry, consisting at the time of writing this survey of 544 factories and about 5000 cheese-making farmers, is represented.

The Board is assisted by:

a. two Professors of Dairying of the State Agricultural University at Wageningen, who act as advisory members of the Board;

b. an Advisory Committee for drawing up the annual programme of work;

c. A Committee for testing machines, appliances and raw materials.

The first chairman of the Board was the Director of Dairy Division and Government Dairy Inspector, Dr. Ir. F.N. Boekel.

The general management of the Institute is entrusted to a Director in Chief, who is also responsible for the direction of scientific and technical research. He is assisted by a Director for financial and commercial affairs, who is also
Dr. J. W. Pette has been Director in Chief of the N.I.Z.O. since its foundation. It was under his guidance that the foundation of this institute was brought to a successful conclusion.

The activities of the institute

These can be summarized as follows.

1. Scientific research and technical experiments in the handling and processing of milk and, as far as possible, in milk production. This research is based upon an annual programme of work. In addition to this research is carried out in collaboration with other institutes.

2. Testing of machines, appliances and raw materials used by the dairy industry and for milk production.

3. Work for individual factories, such as investigation of troubles, and advisory work for improving the quality of products. Advice is given on the improvement of methods of manufacture, and in cases of serious trouble in the dairy if these cannot be remedied by the regional information offices and technical services.

4. Diffusion of the results of investigations by means of scientific publications, annual and other reports, leaflets, popular monthly columns in the trade journals, demonstrations, excursions, photocopies, photographs, films and slides.

The N.I.Z.O. library lends books and journals, draws up reviews of literature on certain subjects, and supplies documentary information. The institute also supplies cultures for the preparation of butter, cheese and yoghurt, if required on a subscription basis.

The laboratory

The laboratory was designed by the architect, G. Hamerpagt of Arnhem, in collaboration with the N.I.Z.O. staff. There are three wings; the west wing, intended for bacteriological and administrative purposes, the east wing, mainly for chemical and physical work, and the north or technological wing. All wings consist of a basement and a ground floor. The front wings also have a first floor.

The stairs, with plastic banisters, and the corridors meet in a big central entrance hall, where the telephone-exchange, a waiting-room and the lift are situated.

The building is of concrete, the spaces between the concrete columns being pebble-dashed, this design giving the building a bright appearance. The end walls are of brick. By making light-channels around the wings, the basement is well lit by day-light.

The ceilings of the corridors are lower than those of the various rooms and in the shafts thus created, and in the hollow walls, all the piping is situated, invisible but easily attainable. Some of the outer columns are hollow and contain the piping of the central-heating system. Over 40 km (25 miles) of wires were laid in the laboratory. There are about 1000 windows. In order to keep costs down they were set directly into the concrete. The heating of the rooms facing the sun is regulated by separate thermostats.

The inner walls may be removed, if necessary, without damaging the structure of the building itself. Modern building materials were used to a large extent in the various rooms, and there is adequate working space and excellent lighting. In every room the air is changed up to 5 times an hour by a ventilation system hidden in the inner-walls. In autumn and winter the ventilation air is heated. The walls and doors are painted with so-called functional colours. Every room has a small picture rail on which can be hung diagrams, maps, etc.
The laboratory has a lift, an internal telephone exchange, and a system for calling personnel. Extensive measures against fire have been taken. There are fire-hoses, fire-alarmes, sprinklers in every laboratory, and fire-extinguishers; the laboratory units are connected by doors; there is a fire brigade consisting of members of the staff.

The laboratories are situated in the front of the building; the auxiliary rooms are in the back, opposite the laboratories. Every laboratory is divided into three units and every worker has his own writing room. The floor-covering consists of plastic asbestos tiles. The benches are covered with a plastic layer and are supplied with gas, water, and electricity. Every unit has two beech-wood benches; every laboratory has one balance room. The windows facing the sun have aluminium venetian blinds.

The technological wing has a complete installation for making all milk and dairy products on a small scale, and has storage rooms of different sizes for the storage of dairy products at different temperatures and humidities. All plant and pipe-lines that come into contact with milk are of stainless steel. The equipment of the technological wing consists among other things of two cheese-vats of 45 gallons, a pasteurizer, and a separator (both of 90 gallons per hour), a homogeniser, two tanks of 112½ gallons, a vacuum-evaporator (66 lbs. per hour), an atomiser (11 lbs. per hour), two churns, a sterilizer and equipment for making ice-cream and process cheese.

Some of the important auxiliary rooms are the media and sterilising section, the instrument-making section, the photographic and film unit, the glass-blowing section, the washing-up room and the boiler-house.

The administrative departments include the Board Room, the Lecture Room, the typists' room, the office, the library, the information section, a kitchen and a canteen.

The Experimental Factory

The experimental factory is built in the form of a U. Between the legs of the "U" the boiler-house is situated, which contains two boilers (14 atmospheres pressure with heating surfaces of 80 and 120 m²), a water tank (60 m²), high and low tension plants, a water purification installation, a canteen, and a drying and dressing room.

Windows, doors, gratings and sky-light frames are made of unpainted aluminium. In the experimental factory all plant and pipe-lines that come into contact with milk are of stainless steel.

The front part of the ground floor accommodates the milk reception room with a transportation belt (400 churns/hr) and a churn-washing machine, the pasteurizing and separating department (filters, milk and whey separators, and pasteurizers from 1,100 to 2,000 gallons/hr), the buttermaking-department (two churns of 700 gallons) a space for making ice cream and other milk products, and a number of cold storage rooms (down to -40°C). On the first floor are storage tanks (nine tanks from 2,000 to 9,000 litres, total storage capacity 44,000 l), storage rooms and a room for the souring of cream. In the east wing cheese is made and stored. There are two cheese vats of 4,300 litres and two of 2,300 litres. The brine-room, tiled from floor to ceiling, has ten large brine-vats and plastic conduit-pipes. The total length of the cheese-shelves is 8 km (5 miles), the brine-surface about 80 m².

In the west wing are sections for the manufacture of condensed milk and milk powder, a hall for the testing of machines, a workshop, a garage and an office. The capacity of the pressure and the centrifugal atomizer towers is respectively 4 cwt/s. app. and 24 cwt/hr, the capacity of the vacuum evaporator is 2½ tons/hr. The two cranes in the hall can each lift 5 tons.

All the pipe-lines radiate from the large basement, and there is a refrigerating-plant, including three compressors of which cool a fresh water reservoir. All the water used is pumped from a well. The various laboratories and test rooms are supplied from mains with water, cooled water, compressed air, and steam.
In this experimental factory, designed by the architect G. Feenstra of Arnhem, all milk and dairy products can be made on an industrial scale. There is enough space to make duplicate experiments or to compare new plant with existing apparatus.

The factory is in operation every day, and started in May 1955 with an annual milk intake of 2,950 tons. The milk is bought from the dairy factory "Concordia", next to the institute, and is delivered direct to the experimental factory by the farmers.

If the products are not of poor quality as a result of experiments, they are sold in the normal manner.