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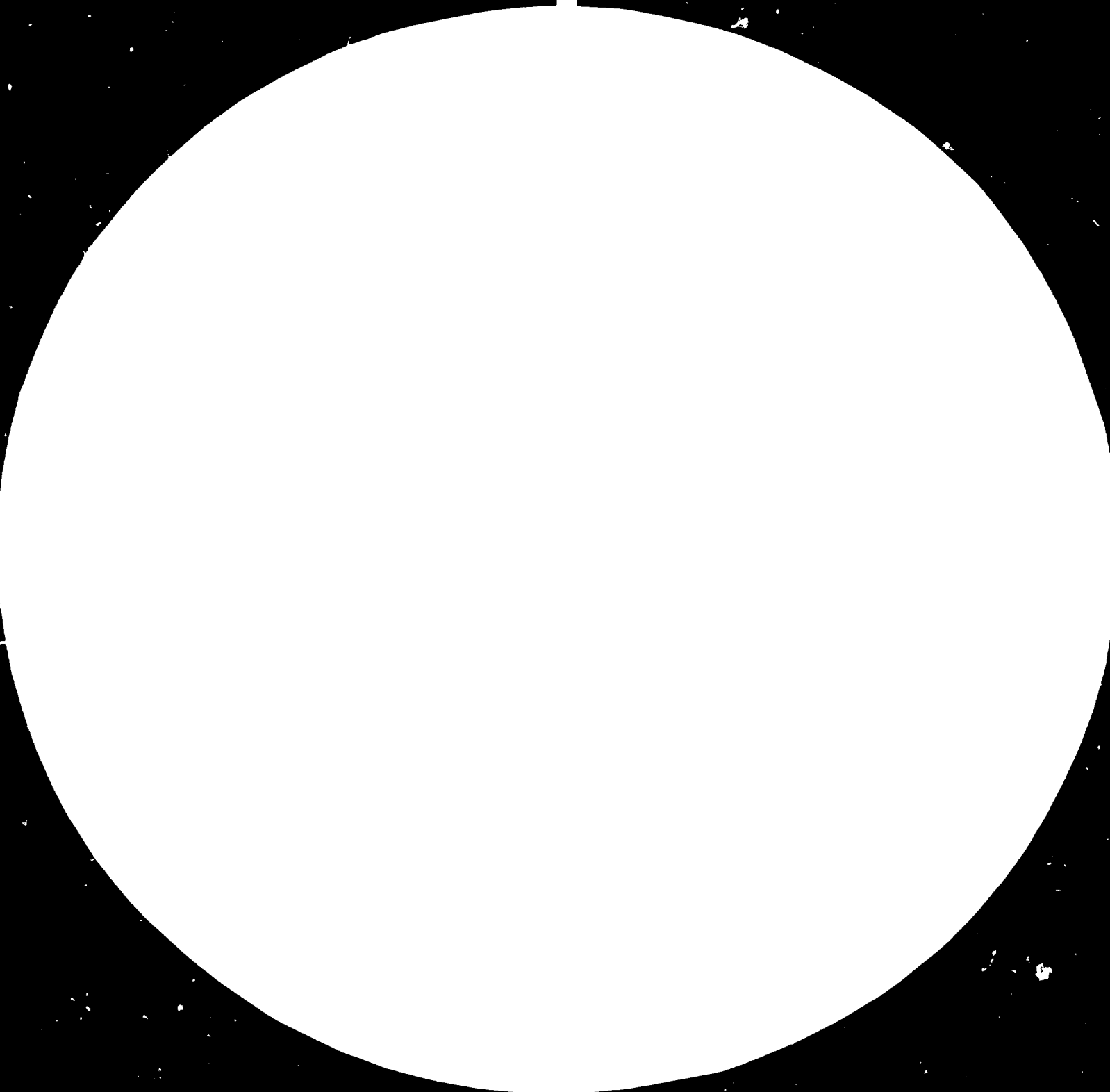

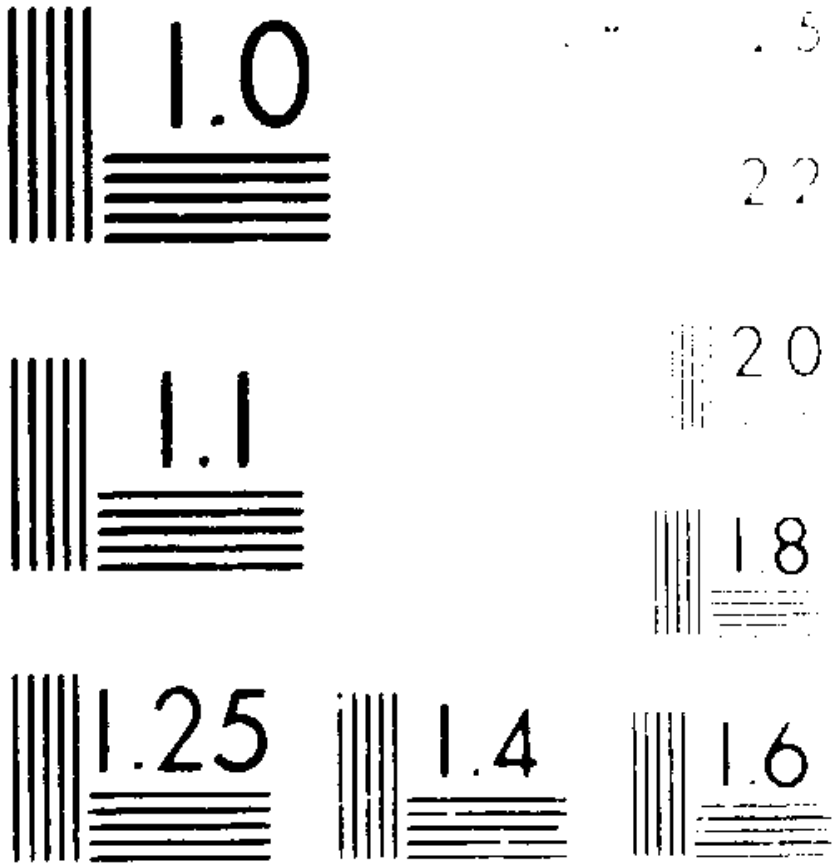
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RESTRICTED
DECEMBER 1982

PROYEK BALAI PENGEMBANGAN
DAN PENELITIAN KULIT

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Indonesia.

PROJECT INS/78/001
IMPROVEMENT OF EXTENSION SERVICE AT THE INSTITUTE FOR RESEARCH AND DEVELOPMENT OF LEATHER AND ALLIED INDUSTRY.

FINAL MISSION REPORT OF

TANNERY EXPERT

by

A. LESUISSE
UNIDO EXPERT

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Attachments

1. Suggestions for a Documentation and Information Service

2. Suggestions for a new project,s programme

3. UNIDO Draft Proposal for the Improvement of Raw hides and Skins Supply and Quality

4. Proposal for a method for Determination of Stiffness

5. Standard process for chromium recycling

6. Waste water treatment at the MIE Magetan

LIST OF ABBREVIATION

1.	ALT	: Academy for Leather Technology in Yogyakarta
2.	BIPIK	: Bimbingan dan Penyuluhan Industri Kecil (Guidance and Counceling for SSI)
3.	CSFC	: Common Service Facility Center
4.	CTA	: Chief Technical Adviser
5.	F and D	: Fashion and Design Center
6.	IRDLAI	: Institute for Research and Development of Leather and Allied Industries (formerly LRI : Leather Research Institute)
7.	LIK	: Lingkungan Industri Kecil (same as 8)
8.	MIE	: Mini Industrial Estate
9.	m / m	: man - month
10.	NAFED	: National Agency for Export Development
11.	SF	: Square Feet
12.	SSI	: Small Scale Industries
13.	TPL	: Tenaga Penyuluh Lapangan (Extension Officers)
14.	UN	: United Nations
15.	UNDP	: United Nations Development Programme
16.	UNIDO	: United Nations Industrial Development Organization
17.	DIN	: Deutch Industrie Noemen
18.	ASTM	: American Society for Testing Materials
19.	ICT	: International Council of Tanners
20.	IULTCS	: International Union of Leather Technicians and Chemists Societies

INTRODUCTION

This report covers two missions, the first from January to June 1981, the second from April to December 1982.

In accordance with the job desvription, the main activities were assistance to the IRDLAI and through the extension services of the Institute assistance to the small scale industry.

An activity report was delivered in June 1981.

During the last eight months of his mission, the expert was alone, he wishes to acknowledge full commitment to the job of all Indonesian colleagues counterparts; without their collaboration no valuable results could have been reached.

He also wishes to express his sincere thanks to the National Director of the Institute who at all times supported his work and gave valuable advise and facilities.

CHAPTER 1. ACTIVITIES CARRIED OUT

The expert's activities in the implmentation of some of the objectives of the Project were mainly concentrated on assistance :

- to the Institute
- to the Mini Industrial Estate Magetan

Subsidiary short technical extension was given to :

- Karet Tenosin Area - small reptile tanners,
- Leathergoods cluster Manding,
- small tanners in Sleman and Magelang areas
- assistance to the local industry.

1.1. ASSISTANCE TO THE LEATHER INSTITUTE (IRDLAI)

1.1.1. Training

Senior staff of chemical, physical and biological laboratories ; of standardization section, of experimental and instrumental sections and of evaluation and compilation of datas have been assigned for training to the tannery expert.

Training was given on :

- standardization of testing methods,
- sampling, with special reference to sampling of service shoes,
- leather physical testing,
- leather chemical analysis,
- fastness testing on leather,
- interpretation of results,
- quality control, main tests on leather, shoes and leathergoods, selection of tests,
- testing of shoe components, rubber solings, manmade upper materials, textiles, adhesives,
- specifications and guidelines for leather, shoes, leathergoods and other materials used in tannery and related industries,
- examples of specifications and requirements for : safety gloves, ladies shoes, men service shoes (casual army shoes) handbags, gloves.

Short training was given on complexometric analysis for determination of calcium and magnesium ions ; chemical oxygen demand of waste water and water hardness.

1.1.2. Process and product improvement

Trials were conduct to investigate :

- improvement of flexibility of sole leather
- improvement on liming turtlefins to smooth the hard central shells by localy painting with sulfide,
- improvement on liming shark skins (tunny fish) to permit easy removing of scales by long time lime treatment,
- finishing of fleshside of vegetable sadle leather with hide glue, casein or soap. This treatment closes the open flesh fibers.

After drying and dusting with talc, the flesh side is glazed to give a smooth and even surface.

- retaning, dyeing, fatliquoring and finishing of furniture and clothing leathers,
- production of football leather,
- sulphur deplickling and pretanning of skins, production of drawn or shrunken grain on sheepskins (goatgrain imitation),
- improvement of vegetable tanning of buffalo hides.

1.1.3. Conservation of raw hides and skins

1.1.3.1. Salt and brine curing.

Because of the climatic conditions in Indonesia, the majority of hides and skins is dried. Drying gives good protection against bacteries but high temperature and sun exposure cause gelatinisation of collagen and migration of fat. Further, the stretching on frames causes disturbance of the structure especially in the bellies and is at the origine of loose grain.

Trials were made by salting method and the hides examined after 6 and 10 months conservation. They show important bacterial growth as red heat on the flesh side and hair loosening. The external folds of the packs were overdried. The conservation period of 6 months and more was to ambitious.

In the country, some hide collectors are making short term conservation by salting fresh hides. Such hides were examined and processed, no bacterial damage was assessed but the structure of the hides was very plumpy and vein and growth marks pronounced. This defect comes likely from insufficient cooling and deshydrating, this needs to be investigated.

Trials were conduct by wet salting or brine curing in the hide processor. This method is rapid and efficient, but needs investments in machinery.

It can be used in equatorial countries for short term conservationover one or two months.

Different kinds of antiseptics, namely two of local production (cresol and hypochlorite) were used without significant differences.

The hides were examined after one month, red heat was apparent on the edges and hard zones of the knies but no other bacterial damage was observed. After further processing, the hides showed good structure, smooth grain and no looswness or pipeness.

1.1.3.2. Conservation by pickling and in wet blue.

Part of the brine cured hides were processed to pickle or to wet blue, treated with antiseptics and stored.

After 5 months storage, they are still in good conditions. Sheepskins, stored in dry pickled state, during one year and more were processed. They showed important decrease in tear resistance and needed sulphur pretanning.

1.1.3.3. Processing of fresh hides.

Fresh hides coming from the slaughterhouse were washed, un - haired and limed and processed up to wet blue. They showed a very plumpy structure and apparently a lower yield in surface. However, the results are encouraging and more extensive work on fresh hides needs to be programmed.

1.1.4. <u>Clean technologies</u>

1.1.4.1. Enzymatic soaking and unhairing.

To lower sulfide content in waste waters, enzymatic soaking and unhairing was applied with fairly good results.

Though enzymatic chemicals have to be imported, their use is further investigation worth.

1.1.4.2. Recycling of chromium.

For tanning of the hides from conservation trials, the waste tanning bath was recycled.

After each tanning, the used chromium bath was collected analysed and added to a fresh liquor. This is one of the chromium recycling techniques and gave good results.

1.1.4.3. Use of waste products

A acid chromium alumn is available as waste product from the food industry.

This waste was used on delimed and bated skins. The penetration was rapid but the basification had to go very slowly and took a long time. In the first working conditions, it was difficult to avoid stains of overbasification. At shrinkage temperature of 100°C, the leather is flat and its structure poor. After retanning with vegetable tannins, a fairly good leather is obtained.

This preliminary trial, needs further investigation.

1.1.5. Testing laboratory

A method for evaluation of hardness of sole leather was developped on the Tinius Olsen Stiffness tester. It is suitable for heavy leathers only and may also be used for other materials, e.g. leatherboard or fibreboard.

The evaluation is made by the force needed to bend through a given angle.

1.1.6. Assistance for R and D programmes.

Suggestions were made and discussed for Research and Development programmes for the next years.

During the Project, the Technological Development and Industrial Development Departments of the Institute were reorganized and strengthen. The Institute has operated a important move in the right direction and is now a valuable tool for the development of the Indonesian Leather Industry, particularly the Small Scale Industry.

In order to give further assistance and to follow the evolution of the needs, the Institute needs consolidation and development of new activities.

1.2. ASSISTANCE TO THE M.I.E. MAGETAN

The Magetan Mini Industrial Estate has been officially opened for operation on the 6th of June 1981 by the Minister of Industry and the Governor of Jawa Timur. (East Java).
This has been one of the major assistance tasks of the Project.

Twenty nine (29) small tanners and 19 footwear entrepreneurs were moved from their home workshops to the M.I.E. and gathered around a common service center where they can make use of machinery. They also have assistance of extension officers (TPLS) and a Cooperative.

At a early stage, some of the entrepreneurs were assisted by the extension team of IRDLAI and UNIDO experts.

Afterwards, the assistance and activities were concentrated on

1.2.1. Common Service Facility Center (C.S.F.)

Lay-out for machines and pits, training and instructions for running in of machines and drums were given.

Production was started to have the C.S.F. in working during the inaguration.

Advice and suggestions were given for work organization, expansion of the Service Center and purchasing of new machines and equipments.

Trials for improvement and diversification of production were programmed.

1.2.2. The entrepreneurs

Standard lay-outs for the three types of workshops, 10 x 8 m without drum, 15 x 8 m with one drum and 20 x 8 m with two drums were drafted. All the workshops with soaking, liming and tanning pits.

Many entrepreneurs asked a lay-out with expansion of the building for beamhouse and/or leaching.

A booklet with instructions for running in of drums, maintenance and safety measures was distributed.

Production of sole leather, sadle leather and wet blue was started at five entrepreneurs.

Trials were made to improve the yield and aspect of sole leather.

1.2.3. Training of counterparts and TPL's

Training was given on :

- revision of basic knowledge on physical and chemical hide constituents,
- conservation methods,
- influence of drying on fiber structure, on loss of combined hydratation water, on displacement of fat and soluble proteins, on gelatinisation and bacterial damage,
- rewetting, use of wetting agents and bactericides, influence of salt (NaCl) on osmotic pressure phenomenon, use of alkali to give light swelling,
- setting up of flow-sheets; references to raw material, evolution of weight during processing, controls, consumption of chemicals,
- costprice calculations for sole and upperleather.
- Raw material, chemicals, labour, energy, overheads, importance of financial costs and incidence of loans on the overheads, differences between material cost, processing costs and overheads, relation between overheads and production,
  permanent inventory of chemicals and management of stocks,
- liming, difference between epilation and liming ; pitliming ; painting and drumliming, liming as a way to conservation,
- production of leather, standard method for wet-blue and sadler leather, production of vegetable or chromium tanned splits,
- running in of drums, sharping of fleshing and splitting knives, maintenance and safety precautions,
- importance and treatment of solid waste ,
- survey on pollution and water treatment.

1.2.4. Production of wet-blue for export.

At a group selected entrepreneurs, a trial for production of wet-blue was made and send to Europe.

With special retanning and finishing, a Belgian tanner could overcome the typical loose grain of jawn hides and ordered for deliveries of 100 hides / month.

Unfortunately the follow-up of the production of wet-blue could not be assumed because of :

- financial difficulties. The entrepreneurs have no financial possibilities to invest in purchasing of hides and chemicals,
- high prices of hides and chemicals. Indonesian raw hide's prices are 30 to 40 % higher than the world price. Chromium (25 % Cr_2O_3 salt) cost is two times that of the European market,
- quality of domestic hides. Because of their poor quality the Bali hides could not be selected. In a good Java origine, only one third of the hides could be selected for export.

Through appropriate sorting at the raw, delimed, tanned and crust stage, the remaining leather (70 %) was used for various productions of upper leathers, full and corrected grain. Up to now the entrepreneurs have no market for that kind of leathers.

- high cost of packaging and transport.

Even with low labour cost, the price of the local produced wet-blue is much higher than the international cotation (at this time 1 US dollar per square foot).

On the other hand, if export trade is intended, the MIE needs a central and internal organization for work programming and control, collecting and selecting, packaging and shipping.

1.2.5. Improvement of production.

An important improvement of the traditional production was obtained when some of the entrepreneurs move from flat lying to hanging in the tanning pits. Regularity of color, absence of woodmarks, folds and stains resulted from hanging and further improvement could be reached if only one or two sides were hanged on one staff instead of five or six like it is now.

Some agitation during pit-tanning would also give better penetration.

For reduction of tanning time, light pickling was introduced with success for production of sadle leather.

The delimed hides are pickled during one hour in conventional acid salt medium, then horsed during one night to allow slow repartition of the acid and to become a pH of 3, 8 - 4 which permits to go in a two baume pit where complete penetration is reached in 24 hours.
The tanning is terminated in a 4 baume pit during two days and no drum tanning is needed.

Mimosa extract or Yukan (Chineese mimosa) was first used in this quick tannage. Because of increase of costprice, only a small quantity of mimosa is now added and acacia bark is used as main tanning material.

1.2.6. Diversification of production.

Magetan is known as producer of a cheap and low quality leather and has a market for that kind of product.

Better leather or yield are accepted by the buyers if there is no price increase.

As the raw material represents 65 to 70 of the price of finished leather, the entrepreneurs have only small means for adding labour or chemicals costs.

The only way to go out of that vicious circle is product diversification to bring new types of leathers on the market.

For the time being, it is not possible to produce sole leather in butts, necks or bellies or to increase the yield in weight because the market is restricted to small shoe-manufacturers producing " all leather " shoes and using the lower parts of the hides for insoles, heels, fillings, etc.

Sadle leather, vegetable tanned with natural colour is used for traditional carved leathergoods.

The fleshside of that leather is rough. Finishing of fleshside with hide glue, casein or soap gives a smooth and even surface and a real improvement of aspect of the leather for a very low price increase.

Diversification was introduced by pigment finishing of low grade sadle leather in a range of colours, embossing grains and double shade seasoning. Such kind of leathers can also give a diversification in the production of leathergoods.

Split valorization. The splits are sold after rolling without trimming or finishing for a very low price (3 to 5 % of the value of raw material).

Pigment finishing of splits was introduced for low price leathergoods.

1.2.7. Waste waters.

The waste waters of the MIE are collected and send to 3 sedimentation tanks before discharging in the river.

After a few months working, the three tanks are full with sludge and the waste waters are discharged without sedimentation.

To allow cleaning without interruption of waterflow, two proposals were made :

- building of 3 new tanks in parallel with the existing pits allowing cleaning of one set whilst the other is in use.
- construction of a by pass seewer allowing disconnection for cleaning one by one each of the tanks.

The second proposal was accepted and the by-pass seewer is in construction.

Waste water treatment by sedimentation is only a temporary answer to the pollution problem. On request of the Ministry of Light Industry , the Institute will undertake a study for a comprehensive waste water treatment.

Some informations and datas were collected to help the Institute ,namely :

- during the period from 13 July to 5 August, pH and flow were measured every hour between 8,30 and 12,30
- during the period of 8 to 30 September, evaluation of pH and settleable matter were done.

The so collected datas show that most of the time the waste waters of the MIE are alkaline. On 80 pH measurements, 37 are above pH 10, 38 between 7 and 10. Only 5 measurements were acid but no one below pH 6.

Taking into account that all the entrepreneurs are making vegetable tanned leathers, the discharged waters are soaking , liming and washing waters. This explains the alkalinity.

The prevalence of alkaline waste baths gives a neutralizing of the sporadic and low volume vegetable waste liquors.

Up to now, only one tanner is using chromium so that the amount of chromium in the waste waters is very low and precipitated, already in the sewers, by the alkaline flow.

The variation of setteable matter, on the other hand, shows very big variations going from 30 to 400 ml/liter after one hour static sedimentation.

The high amount of setteable matter correspond with discharging of liming baths and when lime and vegetable waste liquors are coming together, the waters are strongly coloured.

The variations in working programmes at 29 entrepreneurs make any average evaluation impossible.

Important part of the setteable matter seems to be unslaked and undissolved lime, this must be confirmed by analysis and further examination together with determination of other parameters (BOD, COD, S^{--}, etc) during the programmed study in 1983 at the Institute.

At the present time, because of the high variability in flow and setteable matter, it seems that equalization would take to much time and energy.

Despite not recommended in usual and classical waste water treatment, it seems that sedimentation is to be applied at Magetan.

Elimination of setteable matter by sedimentation would give easier possibilities for further treatment for example in aeration ditch.

On the other hand, the sludge of sedimentation, with its lime and proteines content represent a good fertilizer that can be used in the country.

Only an in depth study will give valuable informations, the above mentioned datas and considerations are not more than orientation informations.

CHAPTER 2. RECOMMENDATIONS.

2.1. The INSTITUTE

The Institute has operated an important move in the right direction.

With a fairly good equipment, as well for the experimental workshops as for the quality control and research laboratories, and with a well structured organigram, IRDLAI has become a body able to perform and provide services to the Industries.

With the steadily growing leather industry, especially in small and medium scale, the Institute has to develop new activities and bring them in line with the increasing and rapidely changing requirements of the Leather and Allied Industries.

Recommended new activities are :

- creation of a Documentation and Information Service
- development on non-leather materials
- promotion of home-made chemicals and by-products
- environmental studies.

2.1.1. Documentation and Information Service.

As well for the optimal working of the Institute-research, extension, assistance - as for the needs of the industries, scientifical, technical and trade information must be available and disseminated.

The IRDLAI's library needs an urgent updating. Sectorial world-wide literature is not available or distributed.

Trade and technical informations and publications, statistics, surveys, official and government publications, standards, research reports, when available are disseminated in the various departments and need to be centralized and classified.

Attachment 1. ; gives some suggestions for the development of a Documentation and Information Service (D.I.S.) working on :

- collecting informations,
- classification,
- dissemination.

Such a service is essential and would be of high utility

- for research and development activities,
- for authorities in charge with planning and for investors,
- for the industries,
- for the training activities.

2.1.2. Non-Leather Materials.

With the increase of consumption and production of shoes and other leather products, a shortage of raw hides and skins is foreseable.

Other materials like rubber, elastomers, plastics, textiles, man-made uppers and linings will more and more come in use.

There is urgent need to investigate the availability of those materials, their properties and behaviour, and the possibilities of producing them in Indonesia.

2.1.3. Home-made chemicals and by-products.

Imported chemicals are very expensive, especially when they have to be imported in relatively small quantities. Further , the import has a negative impact on the commercial balance of the country.

A resource survey of domestic materials is recommended to derive benefit from local products and from by-products of other industries, namely : bactericides and solvents from the petroleum industry, deliming and scudding agents from waste of suggar industry, fats from fisheries and meat industries.

The growing chemical industry in the country will also bring on the market local products, e.g. salts, bichromate, acrylic resins.

Important is also the valorization of natural products : vegetable tannins, natural dyestuffs, waxes, kaolin, earthpigments, etc.

2.1.4. Environmental studies.

The outflow of the tannery pollution into the natural environment poses more and more serious problems.

Tannery waste water and solid wastes are responsible for pollution. There is need for detailed study and research on this serious environmental problem and its treatment.

Pollution treatment starts with adaptation of the tannery technology by reduction of water consumption and of pollutants, recycling and pre-treatments.

The preparatory and preventive aspects of any tannery depollution study are essential to the success of the solution decided upon.

The most classical water purification techniques can be applied to tannery effluents with a certain success but leading to the construction of big treatment plants, out of all proportions with reality and possibilities of the Industry, and without giving any satisfactory solution as far as purification residues and sludge are concerned.

Solid waste : sludge, untanned and tanned trimmings, fleshings, shavings, buffing dust, old bark, are not to be neglected and are investigations worth.

2.1.5. Follow-up of studies.

During the last years, the Institute had programmed with success a fairly large amount of work.

In some cases, the results are difficult to transfer in practice, in other cases, they are still in a preliminary stage and have to be maintained and developed.

2.1.5.1. Raw material - hides and skins.

Everywhere over the world, hides and skins are a by-product of the meat industry and considered as a waste by breeding farmers and slaughters. It is only for the tanner that they represent a valuable material.

Due to shortage and high demand, the collectors are becoming high prices and are not inclined to improve the conservation.

The Java hides have a good structure and grain, unfortunately they are badly affected by the drying conservation.

Despite the difficulties to become improvement at the breeding stage as well as at that from slaughter and collector, the Institute must go on with research on conservation and maintain close contacts with veterinary and husbandry officials.

It may be of interest to consider, at longer term, the erection of combined abattoirs and part-processing plants for short term curing or processing up to lime of picked state.

2.1.5.8. Quality control and testing laboratory.

The quality control and testing laboratory is well equiped and has the possibility to answer very quickly to requests from the industry and consummers. It gives also assistance to the extension and R & D departments.

It is recommended to go over , step by step, to international standardized methods, to develop methods for specific leathers (rabbit,grips,gloves and sport-leathers), to extent the range of fastness tests and to start with tests on non-leather materials.

2.1.5.3. Standardization.

It is strongly recommended to adopt and apply international standardized methods and specifications :

- ISO methods and standards - International Standardization Organization.
- ICT methods and specifications - International Council of Tanners.
- IULTCS methods - International Union of Leather Technologists and Chemists Societies.
- other worldwide used methods, e.g. E.E.C ; DIN, ASTM.

On one hand, the international trade refers to those methods and specifications, and, on the other hand, the development of new materials and equipments is oriented to their more and more use.

This is not restricted to leather, but includes other materials like rubber, PVC, textiles, etc.

Of most importance is to start an action to cancel the traditional use of to Javanese square feet - 28 x 28 cm and, or 26 x 26 cm - and to go over to english square foot or better to square decimeter.

2.1.5.4. Tannery applied research and development.

Research and development are the most important activities of a Institute and need continuous efforts to follow the evolution and the requirements of the industry.

Beside the studies on raw material, it is recommended to go on with systematic product/process improvement and diversification and to conduct appropriate applied research programmes in selected fields such as dyeing and finishing, clean technologies and more industry oriented work.

The foreseeable increasing in consumption of leather in a potential market of more than 148 million inhabitants requests the utilization of all resources in hides and skins.

At the present time, for many reasons (high prices,poor quality,distances,marketing.....) export of leather and leather products is difficult. As far as leather industry concerned, it is better to avoid import than to promote export.

In addition to the studies on raw material (2.1.5.1.), local chemicals (2.1.3.) and environment (2.1.4.), the following subjects are suggested and recommended :

- clean technologies in beamhouse and tanning, enzymatic depilation,recycling of lime liquors, improvement of lime slaking, substitution of chromium, recycling of tanning baths,
- retanning of mineral tanned leather to compensate grain loosness,
- dyeing and finishing, standard formulas for selecting dyestuffs and pigments, for shading and special effects on various kind of leathers,
- diversification of products and development of typical products such as batik, Jawa-look etc.
- improvement of quality, especially grain outlook.

2.1.5.5. Applied Research and development in shoe production.

Team leader's and shoe expert's reports give valuable recommendations for research and development work in that sector.

It must be stressed that the shoe consumption per capita is very low in Indonesia (0,6 pairs for footwear and 0,2 for leather shoes).

An increase of the consumption, going with the increase of living standard, is foreseeable. To comply with higher demand by the consummer, within price, confort and fashion requirements, new types of shoe construction have to come in production, such as adhesive solings, velt or flexible shoes.

Transfer of those construction techniques,especially to the S.S.I.; is an important task for the Institute.

2.1.5.6. Fashion and Design Center.

The fashion impact on the Leather industries sector cannot be denied. The Fashion and Design Center is now under full operation both for footwear and leathergoods. Catalogues of shoes and leathergoods designs are being issued, pattern making and cutting service have already been commercially provided.

It is recommended to extent that very usefull service and to bring its activities at an international level with Asian outlook and, printing and distribution of a fashion magazine.

It is also recommended that the F and D would deal with selection of colours and finishing shades for leather and advice on fashion tendencies and evolution like done by the association Euromode.

2.1.5.7. Engineering.

The IRDLAI has been able to give assistance for lay-out and engineering to footwear and tannery enterprises.

A number of machines have been laid-out and developed such as : buffing, staking wheel, drying table, dust extractor.

Maintenance of machinery, availability of spare parts and after-sales service are big problems faced by the Indonesian leather industries, especially the S.S.I.

The creation of a workshop for maintenance and production of home-made machinery and tools for tannery, footwear and leather-goods is strongly recommended.

2.1.5.8. Training.

The training component had priority in the implementation of the project.

The need for training was recognized and the Institute has done considerable efforts to fill it with success.

It has become the National Leather and Leather products Training Center and have started with training activities for other countries, namely fellows of African countries.

IRDLAI is now able to cater direct to the training needs of small scale units by operating through the MIE development scheme and the BIPIK network.

It is recommended to maintain and develop the training facilities for national as well international use, for all size of industry and in all fields, so that IRDLAI will become The South East Asian Institute.

2.1.5.9. International contacts.

The Institute is still suffering from isolation regarding the world leather scene.

It should actively participate with NAFED in International Leather Fairs (Semaine du Cuir Paris; Italian fairs; Bologna Milano; Germany ; Firmasens, Dusseldorf, Offenbach; etc)

Representation to international organizations is also recommended, such as International Council of Tanners, International Union of Leather Technicians and Chemists Societies, International Union of Shoe Technicians.

Only few contacts were kept with similar institutes abroad.

Contacts and co-operation with institutes in developing countries aswell industrialized countries are essential and have to be established.

The IRDLAI have to maintain and extent the technical co-operation among developing countries and to keep in mind the possibilities of use of national experts in UNDP programmes.

National project personnel and local consultants maybe recruited with use of UNDP funds in order to obtain certain technical and professional services or to secure specialized advisory services.

2.2. The Mini Industrial Estate.

The MIE Magetan is facing a lot of problems : water and energy supply , inadequate equipments, absence of essential machinery, spare-parts and maintenance, poor quality of raw material, shortage of chemicals.

According to the opinion of the entrepreneurs,financing and marketing are the two important problems.

Without contesting or underestimating the starting and working difficulties, most of them youth complaint, the MIE experience has proven successfull.

The relocation of the small tanners has improved their work and life conditions, the CSF is giving valuable assistance and the cooperative will hopefully help in management and marketing.

It is recommended that the co-operation between IRDLAI and Directorate General of SI should be broadened and strengthened. This should be achieved through :

- extension activities at other sites in the country,
- technical support,
- specific and applied research at IRDLAI on a case to case basis such as use of low grade raw hides, engeneering, etc.
- industrial training of extension officers:
- extended use of the Fashion and Design Center and the maintenance facilities.

The experience of MIE should be continued with the following improvements :

- stronger managerial structure and assistance from the MIE board,
- establishment of MIE and CSF on business opportunity lay-outs,
- lease or rent for industrial sites, equipments and services with a low financial charge for the entrepreneurs,
- Common Service Facilities should be rationalized and standardized and include maintenance and repair facilities.

More particularly for the MIE Magetan, following recommendations are suggested :

2.2.1. Central Service Facilities.

To realize further improvement and diversification of the production, the TPL's and the assistance team of IRDLAI need equipment and tools to make trials.

It is recommended to foresee a workshop with experimental and laboratory equipments.

Are indispensable in first priority :

- a good balance (accuracy 1 g up to 5 Kg)
- one experimental drum
- a gasburner or heating device
- containers,spoons,knives,spatules,pads,etc.
- thermometers,densimeters,pH papers, indicators.

Second priority :

- one experimental padle
- pH meter
- mixer for preparing finishes
- titration burettes.

Important is that such a lanoratory and experimental workshop should be isolated from the CSF, eventually combined with TPL's office.

It is also recommendedto collect samples of chemicals, tannins, dyestuffs, pigments and finishing products.

The MIE has only few contacts with suppliers of chemicals. Such kind of contacts should be promoted by inviting technicians or representatives from the chemical industry and trade.

For the time being, the entrepreneurs are not interesting customers, but they will become it.

After delivery of ordered machines in January-March 1983, the CSF will have a fairly good equipment.

The new machines are : fleshing machine for hides, shaving setting out, embossing, buffing and stacking machines.

For further investments programmes should be considered, the purchase of :

- Bark Desintegrator
- Splitting machine for hides
- Padle for skins
- Samming machine
- Glazing machine
- Wet rolling machine (see figure)

A open air drying room is needed and to overcome the difficulties with the belt driving system it is suggested to install on the rolling pres a inversor and direct drive gear.

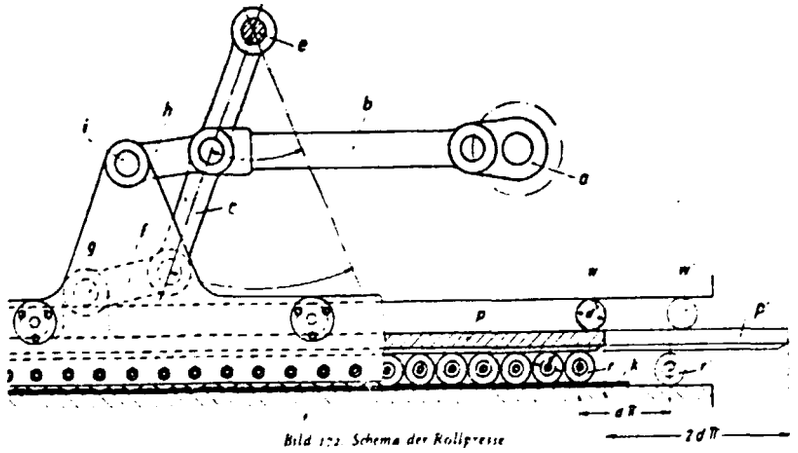


Bild 172 Schema der Rollpresse

2.2.2. The enterpreneurs.

Though a important improvement of the produced leathers was obtained, it is still possible to achieve better results by :

- cleaner work conditions
- hanging in the pits instead of lying
- setting out and step drying
- flesh finishing

The entrepreneurs are reluctant for the use of chemicals because of costs increase but they do not consider the incidence of labour. Wages will not remain at low levels like they are now and attention must be drawn on transport and handling, e.g. putting the splitted hides or skins direct on a lorry instead of on the floor and afterwards on lorry.

As better yield in weight can not be reached because of commercial contengencies, a yield increase can be obtained by valorization of the splits.

By grading the splits after splitting in thickness and sizes, and trimming them different kind of splitleathers can be produced.

- heavy splits for insoles (natural finish) or sandaluppers (pigmented) ,
- medium splits for leathergoods
- light splits for linings.

2.2.3. Diversification of products.

Diversification of production is recommended not only to overcome the reputation of low price and poor quality but also to compensate the lessening of use of sole leather which may be forecast by the more and more utilization of elastomers solings.

The evolution of shoe construction to more simple products with manmade insoles, with units soles and heels will bring a lessening of the consumption of sole leather.
Only high quality sole leathers, soft and easy to use with adhesives will remain on the market.

It is also foreseable that sole and heels units will be produced no more by the shoe manufacturer but by specialised entrepreneurs.

The traditional leathergoods in natural carved vegetable tanned leather give a typical product easy to sell in touristic countries or specialised shops but they do not reach the requirements of other consumers. Other types of leathergoods, such as lady handbags, school and travel bags have to be introduced in a range of leathers : chromium tanned,napoa, suede; in a range of colors and finishes. Valorization of skins can alsc give dif erent kinds of new products.

2.2.4. Waste water treatment.

The waste waters of the MIE contain a lot of suspended solids such as hide and leather scraps. It is necessary to avoid their discharge in the sewers at the exit of each tannery workshop. It is recommended to install screens in each of the tanneries (see attachment).

For the time being, only a sedimentation treatment can be applied.

To be efficient the sedimentation tanks need to be cleaned periodically. It is recommended to use the sludge, containing high amounts of proteins and lime, as fertilizer.

ATTACHMENT 1.

Suggestions for the Development of a Documentation, Information and (Training) Service in the IRDLAI.

One urgent need is for institution of a documentation and information service (or unit) at the IRDLAI.

As well for the optimal working of the Institute-research,extension, assistance- as for the needs of the industries,technical and trade informations must be available and disseminated.

A documentation and information service (DIS) works on following main items :

1. Collecting informations - technical, trade and reference library,
   - journals,periodicals and other publications,
   - collection of statistics.
2. Classification - on card - index
   - storing in library,filles,etc.
3. Dissemination of informations - summaries,
   - bulletins,
   - flashes,
   - manuals,
   - research findings,
   - own informations,
   - Institute's news,
   - standard methods,
   - statistics,
   - trade information,
   - training courses,
   - seminars, meetings,

The start oint of any research or development activity is collecting informations by a bibliographic study allowing to know what is already done,what is the evolution,what result can or may be expected. Material and equipment,human means,budget are to be evaluated by that study.

Statistics (availability of raw material and other products,manpower,energy,market,etc) are needed by authorities and investors to establish implementation of programmes (Pelita) development programmes, etc.

The industries stand in need of trade and technical informations on new technologies,machines,markets,regulations,rules,tarifs,etc. More particularly,the Small Scale industries need information and training on basic technology,processes,organization,price calculation,accounting.
The allied industries,the customers and users,schools and teachers are often asking general information on leather.

In an Institute,the DIS is working very closely with all the other departments,without overlapping but with reciprocal and mutual integration.

Analysis and utilization of informations, aswell guidelines for collecting informations remain in hand from the specialized departments for which the DIS is a tool.

Staff of DIS should be a documentalist with a overall knowledge of technic and trade, a good basic knowledge,bent for teaching, easy writting and advertising.

Knowledge of foreign languages is essential.
DIS needs translators. English is absolutely necessary,German and Frenc recommended, Spanish usefull.
Most of technical publications have summaries in English, German or French.

Classification

It is recommended to start with a per subject classification (decimal classification) or a sectoral classification, e.g.

Tannery : Raw material - proteines
- collagen
- conservation

Beamhouse - soaking
- unhairing liming
- deliming
- degreasing, etc.

For statistics, the classification of the International Customs Tarif is most convenient.
Later on, a classification by key-words may be considered.

Other activities for DIS

storing archives and records,

photocopy, duplication, printing, advertising,

photos, films, diapositives,

storing and keeping of Institute's publications,

distribution, mailing and selling of publications,

subscriptions and buying,

contacts and liaison,

visiting with other Institutes, exchange of informations.

ATTACHMENT 2.

Suggestions for a new project's programm

1. ASSISTANCE tothe Institute for Research and Development of Leather and Allied Industries (IRDLAI).

1.1. To prepare the Research and Development programmes on various fields of the leather industries,emphasizing the use of national resources and maximize local capabilities of supplying raw materials,accessories and maintenance facilities.

1.2. To evaluate the possibilities and needs for the development of a Documentation and Information Service at the IRDLAI and help the Institute to operate in the future as an information and know-how bank.

1.3. To define and quantify outputs and suggestions for Research and Development programmes on non-leather products for shoe and leathergoods industries.

1.4. To introduce dyeing and finishing techniques for selecting, dyestuffs and pigments,for shading,for establishing standard formulas on various kind of leathers,and advice the use and selection of colors.

2. EXPANSION of the assistance to the Mini Industrial Estate Magetan.

2.1. Diversification of production and improvement of the skins production (sheep and goats).
For the time being all the skins (sheep and goats) are transformed in lining leather.
Despite to the low quality of the raw material,it is possible to give an added value to part of those skins by grading and selecting the best skins for other productions.

2.2. Valorization of the splits.
All the splits are used for very cheap soling materials.
Part of the splits can be valorized after selecting and trimming in products for leathergoods and even for shoe uppers.

2.3. Installation and running -in of new machines.
New machines for the CSF are expected in the begining of 1983.
After installation and running-in, these new equipment will give possibilities of further improvement of the production.

3. EXPANSION TO OTHER MINI INDUSTRIAL ESTATE.

Expansion of the assistance model already established. (Magetan-Manding-Karet Kuningan) to other centre in close co-operation with the BIPIK Directorate.

3.1. Reproduce the model of assistance to the SSI carried out during project INS/78/001 in selected placed such as Garut (Jawa-Barat),and Medan (Sumatra),eventually Malang (Jawa-Timur),Banjarmasin (Kalimantan) or Irian Jaya .

3.2. Assistance in the establishment of a MIE : water supply and distribution,energy,lay-out of workshops,selection of machinery and equipments, waste water treatment.

3.3. Assistance in the establishment of CSF : lay-out,selection of machinery, work programmes, organization.

3.4. In co-operation with IRDLAI and BIPIK, assistance in providing transfer of knowledge and training in technology, management and marketing.

3.5. Improvement of traditional production and diversification of products.

3.6. Via the Fashion and Design Centre, produce the adequate ranges of products and assessing, on a permanent basis, the needs for national market.

3.7. In co-operation with IRDLAI and BIPIK, training of TPL's and enterpreneurs.

3.8. Assistance to develop at the IRDLAI home-made and simple machinery and tools with appropriate maintenance facilities.

ATTACHMENT 3

UNIDO DRAFT PROPOSAL FOR THE IMPROVEMENT OF RAW HIDES AND SKINS SUPPLY AND QUALITY

Justification

At the Second Consultation it was estimated that due to damage to the hide or skin on the farm, and during and after slaughter, the global loss in the value of hides and skins was of the order of 2 dollars billion annually. This value would be increased manifold if expressed in terms of finished leather products. The Second Consultation believed that much of this loss could be avoided.

Objectives

The Second Consultation considers that these losses could be reduced to a minimum, and the quality of the raw stock could be simultaneously upgraded by implementing appropriate measures.

Action

The Second Consultation recommeds that an International Hides and Skins Development Scheme be established under the aegis of the appropriate United Nations Organizations, comprising the following stages :

Stage I. The appropriate United Nations agencies should send missions to selected countries in order to :

(a) evaluate raw stock quantity and quality in selected countries using existing and new data. The studies should provide an estimate of the total increased value that could be obtained through increased recovery of wasted raw stock and improvement in quality at ruling international prices;

(b) identify and propose the measures and steps needed in order to obtain such economic gains.

The results of these missions including the recommendations and the measures identified to raise the availability and quality of raw materials for the further development of the sector should be submitted to Governments for their consideration.

The Second Consultation recognized that implementation and financing were the responsibilities of the individual Governments. The missions proposed should, however, assist the different Governments in preparing institutions to implement the campaign.

The object of these preliminary studies is to provide information to Governments enabling them to carry out the detailed technical operation outlined in Stage II.

Stage II . At the initiative of either Governments and/or UN agencies,applications should be made to the appropriate UN agencies to implement Stage II. Possible measures are listed in document ID/WG.319/8,paragraph 2,pages 7 and 8,paragraph 11(e) and(f), page 12, and where necessary,paragraph 23,pages 18 and 19 with the exception of sub-paragraph (a),and paragraph 40, page 25.

Stages I and II should initially be carried out in a limited number of countries or areas and preferably on a pilot scale. Once these initial stages are completed or show positive results in achieving the objectives of the Scheme,Stages I and II should be extended to a wider range of countries or regions.

Funding for Stage I

The Second Consultation strongly recommends that the necessary funding be sought from the relevant UN agencies and other interested bodies to launch the preparatory missuons proposed.

Funding for Stage II

The Second Consultation recommends that the funding of Stage II to implement a large-scale campaign directed towards making Governments aware of the potential of hides and skins in their national economics, should be by international,regional, national (both public and private) institutions and considers that certain countries may wish,on their own initiative,to contribute to specific projects outside their own country.

In support of the measures envisaged under Stage I and II, the Second Consultation considers it essential that UNIDO should urge FAO and other United Nations agencies concerned to devote more attention and provide increased financial and manpower resources to the sections in their organizations dealing with hides and skins in order to enable them to render the assistance required in the implementation of the action programmes formulated by the Consultation.

Improvement of statistical intelligence for hides and skins and derived products.

In order to monitor the International Hides and Skins Development Scheme, comprehensive and comparable sets of production, trade and consumption data are needed at the national level. Statistical series should be such that global developments in the market over a given period are clearly discernible. The exposition of historical trends in production, consumption and trade flows of raw hides and skins as well as products made from them is a prerequisite for projecting future developments of prices and trade opportunities for individual countries. At the country level, a clear analytical picture of the domestic market and its likely developments is a pre-condition for sectoral planning. These requirements can only be adequately met if the data used facilitate comparison between countries and within countries, and this not only at a raw material stage but also at subsequent stages of processing.

The Second Consultation therefore expressed its appreciation of the work undertaken by the FAO Secretariat on the improvement of the statistical and economic intelligence for the hides, skins and derived products sector and in particular the compilation of the World Statistical Compendium for Raw Hides, Skins, Leather and Leather Footwear. It also welcomed the decision by FAO's Committe on Commodity Problems to convene as Ad Hoc Working Party on Statistical Intelligence for Hides and Skins with the purpose to improve the data base, its national and international comparability and the quantitative assessment of the economic and technical factors governing the hides, skins and derived products market.

The Second Consultation accordingly recommended that Governments as well as international and national organizations make every attempt to assist FAO and its Ad Hoc Working Party to maintain the momentum of the work on a standardized country reporting format, an internationally agreed common denominator, appropriate conversion factors and the improvement of statistical analysis for the hides, skins and derived products sector general.

The Second Consultation therefore considered firstly that this work was an indispensible requirement for progress in the discussion of the economic and technical problems in international consultations, and secondly, that the improvement of the existing data and intelligence base would facilitate the effective functioning and monitoring of the proposed International Hides and Skins Development Scheme. For this reason the two efforts,i.e. the Scheme and the statistical improvement should be closely associated; with each other.

ATTACHMENT 4

Proposal for a method of Determination of Stiffness

1. Scope

This method is suitable for heavy leathers only.

It may also ne used for other materials;e.g. leatherboard; fibreboard.

2. Apparatus

TINIUS OLSEN Stiffness tester 6 inch-pounds moment capacity.

Bending span = 2 inches

Pendulum load = 5 inch-pound

3. Test pieces

Cut three pieces of the material to be tested in each principal direction "along" and "across", with the dimension 4 x 1 inch and mark their direction clearly on the fleshside. Mark the line to insert in the clamping jaw on 2.2 inch from one end of the test piece.

4. Test procedure

4.1. Set the bending plate to the bending span of 2 inches.

4.2. Put 5 inch-lbs weights on to the pendulum and adjust load scale to zero.

4.3. Clamp the test piece in the vise with flesh-side upwards and rotate to bring the specimen agains the load pin.

4.4. Set the deflection pointer to indicate zero angle.

4.5. Give increments of 10 load and for each plot the corresponding angle on a diagramme.

4.6. The test is completed :
- at 90 load or
- until fracture or
- until swipping out or
- until the bend angle or load decided upon for the test is reached.

4.7. When the maximum load is reached and if possible, the vise is backed up by increments of 10 until the load pointer indicates zero. The corresponding angles are plotted on the diagramme. The permanent "set angle" resulting from the bend will be indicated by the deflection pointer.

5. Expression of results

5.1. Maximum angle of bend.

If the leather or material cannot be bend through 45^{o}, it is considered as very hard.

The force to bend through the maximum angle and the relative stiffness factor E may be calculated (5.3 and 5.4).

5.2. Angle of bend greater than 45^{o}.

From the diagramme, the force and relative stiffness factor are calculated for a angle of 45^{o} or for any other angle.

5.3. The force to bend through a angle of 45^{o} or any other angle

$$F = \frac{M}{l} = \frac{\text{Bending moment}}{\text{span}}$$

Bending moment M = load scale reading x moment weight.

5.4. Relative stiffness factor ,

$$E = \frac{M \times l}{h^{3} \times a}$$ where

M = Bending moment

l = span

h = thickness

a = angle

6. Evaluation

Very hard = cannot be bend through 45^{o}

Soft = can be bend through 45^{o}

Softness 1 $F_{A} > 200$

Softness 2 F between 100 and 200

Softness 3 F between 50 and 100

Softness 4 F < 50 (very soft)

ATTACHMENT 5

Standard process for chromium recycling

1. Raw material.

Dry cow hides in the range of 6 Kg/hide.

Two hides per trial, it means 20 hides for a ten recycling programme.

2. Flow - sheet.

2.1. Presoaking, in water during 2 to 3 hours.

2.2. Pitsoaking

water	1000 %	
antimold	1 g/liter	
depan 8	1 g/liter	) 24 h - 36 h.
$NaCl$	10 g/liter	

If not enough soaked, further drumsoaking with the same chemicals as in pit soaking.

Weighing to have soaked weight.

2.3. Unhairing - liming (Herfeld)

If there was drumsoaking, drain and keep 25 % of the bath.

If there was not, put the hide in a drum and add 25% water.

Add in one time and undissolved 2 % Na_2S

5 % $Ca(OH)_2$

Drum during 3 hours at 4 rpm.

Add 100 % of water and drum 10 min each hour during 18 hours or until next day.

As the drum may not run during the night, add at the end of working day enough water to cover the hide. The next day, drum 10 min.

2.4. Reliming.

At the end of liming, wash during 10 minutes and hang the hide in limepit.

Fleshing - scudding.

Limepit until splitting, at 2,2 - 2,5 mm.

2.5. Deliming - bating.

Wash two times 10 min.

Deliming water 150 %
Ammonium sulfat 1 %
run 10 min
add 0,5 % sulfuric acid
20 min.

Bating add 0,6 % Oropon
run 15 min.

Wash 2 times during 10 min.

2.6. Pickling. water 100 %
Na Cl 10 % (Be 6)
run 10 min
add 1% formic acid) diluted 1/10
0,5 sulfuric acid
run 1 to 2 hours
and rest overnight.

2.7. Tanning run 15 min
add 10% Chromeduol
run until penetration.

Basify with a 10% solution of Na_2CO_3 until pH 3,8 - 4.
Boil test.
Horse and keep the rest bath for determination of chromium content.

2.8. Recycling.
For the next batch, drain half of the pickle and add waste chromebath to have 100 % liquid.

- Volume of added waste bath = x liter
- Chromium content a g/l x X = A gram Cr_2O_3
- Amount of CrO_3 needs = B gram
- New chromium to add = B - A.

ATTACHMENT 6

WASTE WATER TREATMENT AT THE MIE MAGETAN

1. Evaluation of pH and flow.

Between 12 and 16 July and 3 and 5 August, pH of the discharged water was measured with indicator paper in the sewerpipe at half between the connection of the two main sewers and the sedimentation tanks.

At the same time, flow of water was evaluated by measuring the height of liquid in the pipe and by estimation of the speed of flow. There were no other possibilities to make measurements. Although those measurements were not very accurate, they give some informations.

The results show that the pH is always between 8 and 12 (one exception 7) and that the flow varies from 3 to 5 m^3/hour with sometimes one pic of 6 m^3.

Consequently, the waste waters from the MIE are generally alkaline waters from beamhouse and washing. Occasional discharge of vegetable or chromium waste waters are immediately neutralized by the important amount of alkaline waters.

This means that a preliminary treatment by sedimentation could be sufficient at a first stage and that the elimination of suspended and settleable matters should give a important reduction of pollution.

As the receiving rive has a important flow, it is foreseeable that the remaining organic pollution could be eliminated by aeration in the river.

If not, a secundary treatment must be envisaged.

2. Evaluation of settleable matter.

Between 8 and 30 September, pH and settleable matter were evaluated every hour from 8,30 up to 12,30.

Again all the pH were alkaline.

Imhoff cones were not available so that the sedimentation was determined in 1000 ml measuring glasses and the results expressed in ml after one hour sedimentation.

The variation of settleable matter shows very big variations going from 30 to 400 ml/liter.

The high amounts of settleable matter correspond with discharging of liming baths and an important part of the sedimented solids seems to be unslaked and undissolved lime.

3. Present state of treatment

At the present time, the three sedimentation tanks are full of sludge and consequently in-efficient. There is also sludge in the sewers and inspection holes. There is urgent necessity to clean all the system.

4. Reduction of suspended solids

The waste waters of the MIE contain a lot of suspended solids like hide and leather scraps.

It is necessary to avoid their discharge in the sewers by screening at the exit of each tannery workshop. It is recommended to install a double screen in each of the tanneries. This could be done in a small pit (750x500x500) with one screen of bambou rods spacing 1,5 cm and another with spacing 1 cm. Iron rods should give black stains with sulfide and vegetable tannins. This screens has to be cleaned two times a day (fig.1).

5. Sedimentation tanks

The three existing sedimentation tanks can be used if they are cleaned. At the moment,cleaning is difficult because it is not possible to stop the flow of water.

Two possibilities are suggested :

5.1. Construction of a new tank or of a set of three new tanks (fig.2). This will allow to have one serie of tanks in working while the other are to be cleaned.

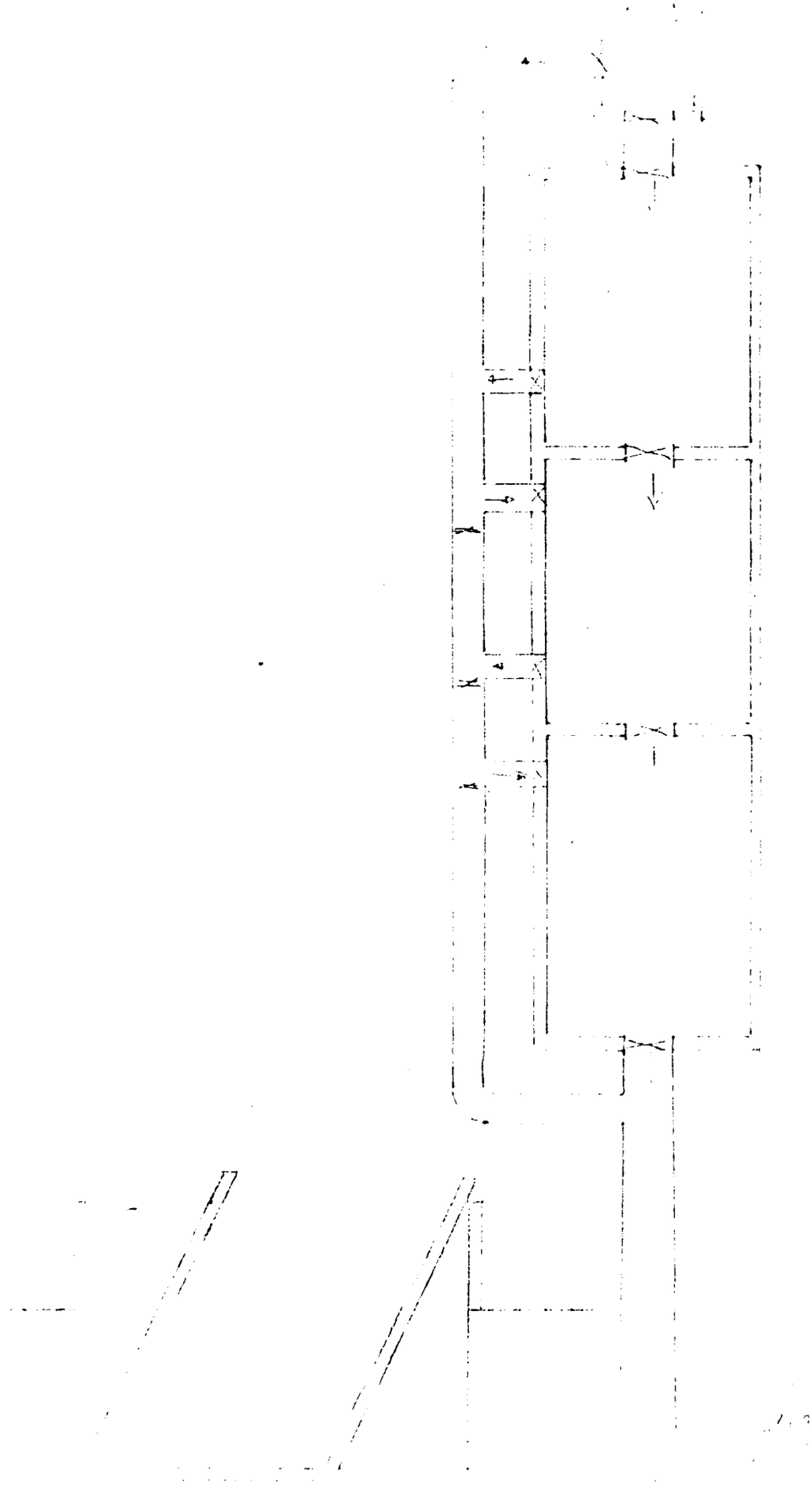
5.2. Construction of a by-pass sewer to disconnect one of the existing tanks to allow cleaning (fig.3).

6. Secundary treatment.

Analysis and examination of water after efficient sedimentation will give information on the necessity to provide for further treatments (chemical and/or biological). The investissements (engeneering and working cost) for such treatments are very high. A good feasibility study is needed.

7. Utilization of sludge.

The sludge contains high amounts of lime and protein beside sand and other dirt. Tannery sludge is a good fertilizer especially for acid soils. Due to the big amount of lime used in Magetan, it seems that the sludge could be used without preliminary drying. This must be confirmed by trials.



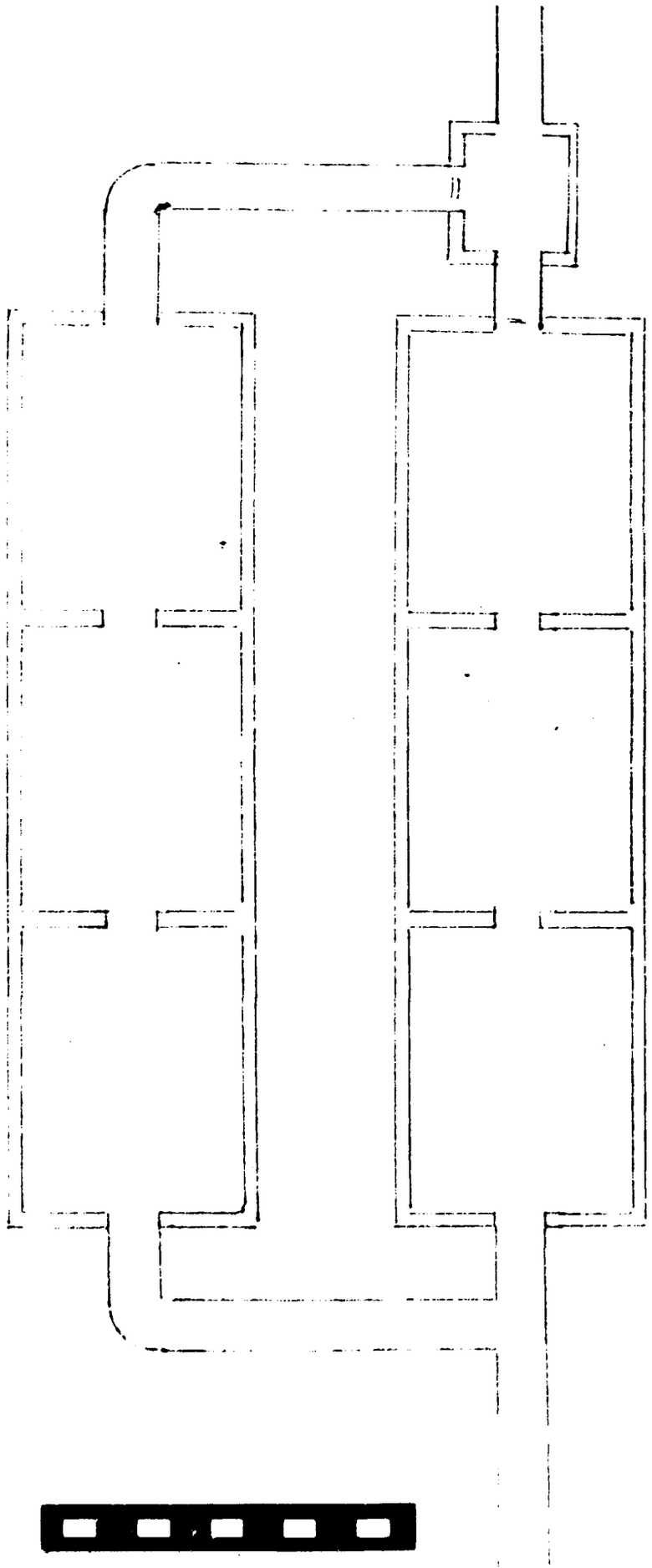


fig 9