HOME

Small Industries

Books reviewed in this section

The Village Textilizer Disk 25, File 33-788

Work from Waste Disk 25, File 33-804

Yay Soybeans! Disk 25, File 33-789

Small industries which produce goods for local consumption play an important role in a healthy economy. Many of the tools and equipment found in other chapters of this book could be the products of or could he used in small enterprises.

This chapter includes publications on the production of pottery, leather, soap, candles, paper, shoes, glassware, rattan furniture, hand looms, natural dyes, dairy and soy products, sewing machine maintenance and other topics. Among the activities that could form the basis of innovative businesses are the recycling of plastics and the production of single-strand barbed wire.

For books on the management of small businesses, see the chapter entitled SMALL ENTERPRISES.

A Potter's Book, book, 383 pages, by Bernard Leach, 1940 (latest edition 1976), $10.00 from Transatlantic Arts, Inc., P.O. Box 6086, Albuquerque, New Mexico 87197, USA, available in paperback only.

Leach has written what many potters consider to be the best reference book on ceramics. This is a book on "the workshop traditions which have been handed down by Koreans and Japanese from the greatest period of Chinese ceramics in the Sung Dynasty. It deals with four types of pottery: Japanese raku, English slipware, stoneware, and Oriental porcelain. The student of pottery learns how to adapt recipes of pigments and glazes, and designs of kilns, to local conditions. A vivid .workshop picture is given of the making of a kiln-load of pots from start to finish ...."

Includes basic recipes for glazes and descriptions of different kinds of kilns and firing methods. Many illustrations. There is a glossary of pottery terms. Highly recommended.

The Self-Reliant Potter: Refractories and Kilns, **Disk 25, File 33-806**, book, 134 pages, by Henrik Norsker, 1987, GATE/ GTZ, DM 24.50 from GATE; or Dfl. 31.50 from TOOL. This is a very good production-oriented pottery book for use in developing and supporting pottery operations that engage in small-scale production, yet produce hundreds of pieces at a time. A major focus is on kiln designs and construction techniques. The operation of kilns, including stacking techniques and devices, is another important topic that is well-covered.

The author is a Danish potter who worked in Tanzania, who realized that the "ceramic literature mainly addresses itself to a market comprising amateur, art potters and industrial engineers in developed countries ... the hobby books are too basic and the engineering books are too advanced for most potters." This book nicely fills a need that is in-between.

"The aim of this book is not to enable somebody without practical pottery experience to start up modern pottery production on his own. The book is mainly written for the benefit of potters already involved with modern pottery, and for teachers and students involved with the growing number of pottery training centres."

A well-done, nicely illustrated book that stands out as a valuable reference for small-scale pottery production.

The Kiln Book, book, 291 pages, by Frederick L. Olsen, second edition 1985, $30.00 from Chilton Book Company, 201 King of Prussia Road, Radner, Pennsylvania 19089, USA.

In this well-illustrated manual the design, construction and operation of kilns for ceramic production is presented with uncommon clarity and attention to detail. Kilns currently in use in diverse cultures are thoroughly examined, offering the student or potter a variety of options to utilize available materials or achieve special effects. The text is quite readable for the amount of technical information contained and provides interesting background and observations on kiln construction and use in South and East Asia, North America, and Europe. Plans, photographs and drawings, along with numerous tables and formulas, are abundant and well-coordinated with the text.

With this book and some masonry skills the reader should be able to construct and fire a kiln from available materials. A sample of the unique and/or noteworthy information provided here:

the characteristics of various refractory brick types;

basic design considerations and plans for specific kilns of the updraft, downdraft, crossdraft, and electric (no draft) type;

instructions for building arched roofs, curved walls, and other brickwork;

calculations for fuel requirements and burner layout for gas-fired kilns;

comprehensive conversion tables;

firing schedules for woodburning kilns;

materials lists for kilns of different configurations..Examples are drawn from a range of small commercial pottery enterprises with facilities that range from the quite primitive to the modern. Some of these options are in use for their artistic rather than strictly practical value. Nevertheless, the broad range of options presented and the straightforward design and construction advice should make this book useful wherever optimal use of local resources for pottery production is a goal.

Kilns: Design, Construction, and Operation, **Disk 25, File 33-782,** book, 256 pages, by Daniel Rhodes, revised 1981, Chilton Schl. Library Services, Pennsylvania, out of print.

"This book is written from the point of view of one who has built and fired kilns rather than that of a theorist .... The principles and methods involved in kiln design and construction receive a thorough and authoritative treatment. The information which applies to the structure and size of any kiln, be it gas-fired, oil-fired, wood burning, or electric, updraft or downdraft, is the basis for discussion of methods and procedures required by specific kilns. Thus, all aspects masonry construction, fuels, burners, combustion, refractory materials, heat retention, and transfer are covered."

Thoroughly illustrated and detailed with photographs and drawings, this book is written in easily understandable English. Included are various original designs, accompanied by step-by-step instructions and diagrams, enabling the reader to construct a kiln with confidence. Firing theory and techniques, temperature measurement and control, and safety precautions are presented effectively for proper maintenance.

Rural Tanning Techniques, FAO Development Paper #68, **Disk 25, File 33-786**, book, 250 pages, 1974, out of print, available for $9.50 from UNIPUB.

This is a very detailed, thorough book on rural tanning techniques. It covers the preparation of hides and skins for tanning, various tanning methods and processes for different types of hides and skins. There is a section on setting up a rural tannery and checking for suitable water supplies, and a section on the tanning process as performed in rural India, using improved techniques from the Central Leather Research Institute in Madras. Very labor-intensive techniques are presented with extensive examples and illustrations from Kenya. Many photos are included.

This book was written for less developed areas where all of the materials and chemical compounds commonly used in tanning processes might not be readily available. Thus, there is discussion of how to obtain the ingredients and make these different compounds, such as vegetable tannins, from barks, trees, and nuts.

Tanning of Hides and Skins, **Disk 25, File 33-802**, book, 225 pages, ILO, 1981, reprinted 1989, Swiss Francs 27.50 (US $19.25) from ILO; also from VITA, ITDG, and TOOL.

Intended for use by tanners in developing countries, to help in the selection and use of tanning processes. A general description of the steps involved in tanning is followed by more detailed information on four different scales of production, ranging from 2 to 200 hides per day..

Environmentally Sound Leather Tanning, **Disk 25, File 33-816**, booklet, 84 pages, by Jaap Kok, 1991, Dfl. 20.00 from TOOL.

This is a well-illustrated, practical introduction to leather tanning, emphasizing minimum impact on the environment. It is intended as a teaching tool, for people who are not already familiar with tanning processes.

This book was based on a tanning course given by the author in Zambia. It is for people "who want to tan five or ten goatskins that can be obtained from the local butcher weekly, with material from around the village and with tools that require a small investment ....

Once someone knows how to make his or her own goat leather, it will not be difficult to tan other types of skins, since tanning principles are all the same."

Home Tanning and Leather-Making Guide, book, 176 pages, by A.B. Farnham, 1950, $4.00 from Fur-Fish-Game, 2878 East Main Street, Columbus, Ohio 43209, USA.

It has been said that this book "contains absolutely everything you need to know old time techniques " In fact, that's not quite true, and **Rural Tanning Techniques** has several advantages over this book. Farnham covers the various aspects of tanning, including how to skin an animal, curing the hides, preparing hides for tanning and the actual tanning and leather-making process. Also included are descriptions and illustrations of the simple sharp tools that are needed, and other considerations such as how to check for hard water, which tanning chemicals to use, etc. The author assumes that the tanner

will be able to obtain the necessary potash and other solutions, and does not cover how to make these materials locally (see **Rural Tanning Techniques)**.

The last three chapters of the book deal with the marketing of hides. Much of the information is directed at rural American towns, but there is good information on the preparation of hides for shipping and marketing, as well as how to make hides into leather in this section. This book would be useful in teaching tanning techniques, or as a reference for someone who is already familiar with the processes.

Small-Scale Soapmaking: A Handbook, **Disk 25, File 33-811**, book, 80 pages, by Peter Donkor, 1986, £5.95 from ITDG.

Soap can be made by hand at home, or as a small cottage industry, or at a much larger scale. This book covers a cottage industry level of soap production for sale in a larger community, based on the author's experiences in Ghana. An introduction for entrepreneurs and project managers, it assumes that much of the needed equipment can be bought.

Oils and other raw materials for soap are reviewed, along with equipment for mixing, compressing and stamping soap that can handle 20 kg. of material per hour. Typical formulations for various soaps are provided (laundry, hand soap, hand protective cream for mechanics).

Introduction to Soap Making, VITA Technical Bulletin #3, **Disk 24, File 33-781**, leaflet, 23 pages, by Marietta Ellis, VITA, out of print.

An excellent description of the process of home or village-level soap-making. Provides recipes for a variety of soaps made of different materials and with different.uses. Explains how to make your own lye from hardwood ashes, and how to measure the strength of this lye solution. (For example, the author notes that the proper strength of lye leached from wood ashes is reached when an egg will float in it.)

We think this is the best paper available on soap-making in village circumstances.

Recommended.

The Preparation of Soap, **Disk 25, File 33-784**, leaflet, 13 pages, by Ir. S. P. Bertram et. al., TOOL, out of print.

This leaflet includes a method for determining the concentration of lye through the use of a float; it also covers vegetable oils other than coconut oil, which are mixed with lye in different proportions.

Sometimes a bit confusing.

How to Make Soap, Reprint #628, **Disk 24, File 33-780**, 4 pages, Mother Earth News Reprints, out of print.

This is quite good; it tells both how to obtain lye from hardwood ashes and general soap-making hints when using purchased commercial lye. It does have a recipe that uses coconut oil instead of animal fat (mineral oil cannot be used to make soap).

Soap Pilot Plant, Case Study No 3, **Disk 25, File 33-801**, booklet, 32 pages, by Peter Donkor, 1981, Technology Consultancy Centre, out of print.

"To many people in Ghana the Technology Consultancy Centre is synonymous with soap .... The work programme has resulted in some twenty small scale soap plants in Ghana and others in Guinea Bissau, Mali, Sierra Leone, and Togo. It has also led to many of the soap plants producing their own caustic soda and has stimulated the establishment of some twenty small rural oil mills to supplement existing palm oil supplies."

"Now Peter Donkor has been persuaded to pause in his labours to put on paper the story of eight years work and to record the experience gained. It is hoped that many will be encouraged to do what he has done: to apply the knowledge gained from a university education to solve the real grass roots problems of small-scale craftsmen and industrialists in a developing country." The case histories included also make fascinating reading.

Making Homemade Soaps and Candles, **Disk 25, File 33-783**, book, 46 pages, by Phyllis Hobson, 1984, $3.95 from Garden Way Publishing, Schoolhouse Road, Pownal, Vermont 05261, USA.

Lots of recipes for making soap with animal fat and leftover kitchen grease, and for making candles out of animal fat, wax or paraffin. Includes instructions for making lye out of wood ashes (needed in soap-making)..

Simple Methods of Candle Manufacture, **Disk 25, File 33-786**,19 pages, compiled by the Industrial Liaison Unit of ITDG, 1975, £2.95 from ITDG; also from VITA and TOOL.

"The technology of candle making is very old and despite the introduction of mass production methods, candles can still be made by well-established methods which require only simple equipment. Much of this equipment can be made by rural craftsmen" Different waxes and wicks are discussed. Illustrations and descriptions are given for each of four methods of small-scale production.

Small Scale Papermaking, **Disk 25, File 33-798**, book, 325 pages, by A W. Western, 1979, ITDG, out of print.

This is a description and evaluation of Indian small-scale industrial paper mills of 5 to 30 tons per day capacity. The author presents considerable evidence to support the claim that such mills are more economically attractive for developing

countries than the larger-scale mills usually established with imported equipment. In particular, the smaller Indian mills can be located next to sources of supply and cost 2/3 less per unit capacity for the capital equipment. Such mills could mean substantial savings in imported paper and equipment costs for many developing countries, while providing greater employment and learning opportunities for local people.

Case studies with cost details are provided for plants ranging from 1-30 tons per day. Average return on investment for these plants was 27%.

Small Scale Manufacture of Footwear, **Disk 25, File 33-797**,204 pages, 1982, Swiss Francs 25 (US $17.50) from ILO; also available from VITA, TOOL, and ITDG.

This ILO book provides "... technical and economic details on alternative footwear manufacture technologies used in scales of production ranging from 8 pairs per day to 1,000 pairs per day." The document is intended to assist entrepreneurs who wish to either make their equipment locally or minimize the amount of imported equipment necessary. The various operations in the production of footwear of various types are described, along with equipment alternatives. Few drawings are included, and there is much technical vocabulary (explained in the glossary); consequently, this may be difficult reading for the shoemaker who is not familiar with these terms and procedures.

Glassware Manufacture for Developing Countries, Technical Papers 2, **Disk 25, File 33-792**, book, 45 pages, by G. Whitby, 1983, £4.95 from ITDG; also from TOOL.

Here is good introduction to the materials, techniques, fuels and equipment used in small-scale production of glass jars, bottles and other containers. Some existing glass factories produce as little as 250 kg/day, using a few pieces of equipment and a handful of employees. Many photos from factories in Asia are included. Sample calculations for investment and production costs for a 5 tons/day unit are presented..

Barbs, Prongs, Points, Prickers, and Stickers: A Complete Illustrated Catalogue of Antique Barbed Wire, **Disk 25, File 33-790**, paperback hook, 418 pages, by Robert T. Clifton, 1970, reprinted 1984, $14.95 from University of Oklahoma Press, Norman, Oklahoma 73019, USA.

In many places there is a need for low-cost fencing (e.g., to protect reforestation areas and control grazing), but wood and stone are not readily available, and living hedges cannot be easily grown. Hundreds of different designs of barbed wire were originally developed to fit the same need in the western United States. Single strand barbed wire could be produced in developing countries at a cost far lower than that of the double strand barbed wire currently used in these countries.

In industrialized countries, the cost of barbed wire is only a very small part of the cost of erecting a fence, and with high labor costs, maintenance must be avoided. Two strand barbed wire is somewhat more durable than single strand wire, and thus has become the standard form of barbed wire produced all over the world. However, in developing countries, the cost of barbed wire is a much larger part of the cost of erecting a fence. In these places, a fence made with single strand barbed wire would be much cheaper, but would require a small amount of additional long-term maintenance. It should be possible to manufacture single strand barbed wire at a cost of 50-60% of the cost (per linear foot) of double strand wire. Production of single strand barbed wire (from plain wire) could be done on a cottage industry basis, using simple tools.

This volume shows hundreds of different designs, including more than 150 types of single strand barbed wire.

Manual on the Production of Rattan Furniture, **Disk 25, File 33-794**, UNIDO, 1983, 108 pages, publication no. ID/299 from UNIDO.

A good look at rattan furniture production using small industry techniques. The equipment shown includes a variety of machines and locally-made devices for different production steps. The large number of photos and drawings of the production process are supplemented by drawings of furniture designs.

Basic Sewing Machine Repair, **Disk 24, File 33-774**, book, 63 pages, by K. Kiri and S. Kalmakoff, 1979, South Pacific Appropriate Technology Foundation, P.O. Box 6937, Boroko, Papua New Guinea, out of print.

A well-illustrated book on the proper adjustment and care of several common varieties of sewing machines. Oiling the machine, adjusting and fixing the stitch regulator, replacing broken springs, and adjusting needle timing are among the topics presented. A trouble-shooting chart helps in identifying the likely source of specific problems. Very simple language is used along with the 200 drawings.

Handloom Construction: A Practical Guide for the Non-Expert, **Disk 24, File 33-778,** looseleaf manual 163 pages, by Joan Koster, 1979, $9.75 in U.S., $10.00 international surface mail, $14.50 international airmail, from VITA.

"With inexpensive machine-made cloth increasingly available almost everywhere, it seems likely that fewer and fewer people will be interested in producing their own cloth .... Yet weaving can be done in one's spare time using free or inexpensive fibers available locally, and simple, efficient looms can be built from local materials at little cost. Therefore, as long as the loom and fibers cost little, the finished cloth requires an investment in time rather than money .... Because people all over the world have been weaving since the very earliest times, there are many styles and varieties of looms.

This is a book about building and using some of these. Three types of looms, including two variations of a foot-powered loom, are presented here. The book gives 1) detailed directions for building each kind of loom, 2) the advantages and disadvantages of each, and 3) instructions for weaving."

Large, clear line drawings show materials, construction sequences, and weaving techniques for frame looms, pit and freestanding foot-powered looms, and the Inkle loom (a small loom for rapid weaving of strong strips of cloth). All the looms are made from low-cost, commonly available materials. The choice of loom will depend upon the types of fibers available and the kind and quantity of articles to be woven. Tables show fiber and product types and their suitability for the various loom styles. Planning weaves and patterns, finishing fabrics, and use of colors are also discussed.

A well-written reference.

Small Scale Weaving, **Disk 25, File 33-800,** book, 129 pages, International Labour Office, 1983, reprinted 1985, Swiss Francs 20 (US $14.00) from ILO; also available from VITA and TOOL.

The different choices of handlooms and power looms for small-scale production of low-cost cloth for low-income consumers are discussed in this book. Economic evaluations of each technology are also presented for the individual entrepreneur or policymaker. The very simplest hand-operated looms are ruled out, as their slow speed means high labor and management costs for the entrepreneur. (It may be the case, however, that such looms could still be attractive if used at home to generate income for families during spare hours.)

This book identifies the important technical and related productivity differences between looms, and should prove of value to anyone involved or interested in weaving projects.

"When the weft is inserted by hand-thrown shuttle in the weaving of cotton-type fabrics of nominally 1 metre width, picking speeds are most unlikely to exceed 20 picks/min and, more usually, are appreciably less than this. Weaving similar cloths on looms with a fly-shuttle .... Could enable the weaver, if sufficiently skilled, to operate at speeds of up to 40 picks/min .... If the take-up and let-off are mechanically linked to the primary motions, the (entire) loom can be foot-pedal operated. These features, if incorporated in a loom of improved structure and with good bearings, enable the loom to be operated at speeds which are claimed to be in excess of 80 picks/min."

Weaving Technology in India: Jacquards, book, 68 pages, by Puneet Kishore, Development Alternatives, 1990, available from Vikas Publishing House Pvt. Ltd., 576 Masjid Road, Jangpura, New Delhi 110014, India.

"Jacquards are mechanisms that ... allow a large degree of control over the movement of the warp, thereby making it possible to weave simple to very intricate designs .... Making complex designs on the fabric lowers the productivity, but the resulting mark-up in the price of the fabric much more than offsets the extra labor involved. In fact with mechanisms such as the jacquards, the productivity, depending on the complexity of the design, can go down significantly, but the returns are very high. For example, making a bedsheet or a shawl on a jacquard loom with a design on it, can fetch the weaver" 33-70% more per day than producing plain cloth.

A conventional jacquard-equipped loom costs Rs. 10,000, however, and is too expensive for most village weavers. This book describes design work on a low-cost jacquard that would have most of the design flexibility but much less of the cost of a conventional jacquard loom. "The new jacquard costs about Rs. 1000 to Rs. 1500 besides the basic loom about a third of a small conventional jacquard." Additional design work is recommended by the author to make further needed improvements.

The text is supplemented by simple line drawings.

Medleri Charkha: A Self-Winding Foot-Operated Spinning Wheel, **Disk 25, File 33-812**, book, 145 pages, by Mies Bouwmeester and Wim Bloemen, 1991, Dfl. 20.00 from TOOL.

An operation and construction manual for a foot-powered wool-spinning wheel that has been used in India as an improvement over traditional hand-operated spinning wheels. Construction drawings and instructions are provided, but on separate pages from each other. The wheel is made from steel and a bicycle wheel. Readers unfamiliar with the operation of spinning wheels are likely to find this confusing.

Silkworm Rearing, FAO Agricultural Services Bulletin 73/2, **Disk 25, File 33-809**, book, 83 pages, by Wu Pang-chuan and Chen Da-chuang, 1988, order number F6920, $9.00 from UNIPUB or FAO.

Silk production can be an important industry given the right conditions. This book provides a nice introduction to the requirements for successful silkworm raising using the mulberry silkworm. Topics include environmental conditions, cleaning of the rearing area, incubation of silkworm eggs, rearing techniques, mounting and cocoon harvesting. Three other volumes in the series cover mulberry cultivation, silk egg production, and silkworm diseases.

Vegetable Dyeing: 151 Color Recipes for Dyeing Yarns and Fabrics with Natural Materials, **Disk 25, File 33-787,** book, 146 pages, by Alma Leach, 1970, out of print in 1985.

This book is about dyes from vegetable and other natural sources (such as clay and insects). A large number of the dyes are from tropical and subtropical plants in addition to temperate zone plants. The simple recipes and techniques can be used by a beginner.

Sources for dyeing equipment and materials are listed. General principles of dyeing are covered, along with specific instructions for particular dyes. The author notes that different readers will produce slightly different shades when following the same recipe, due to water composition, timing, temperature and other factors. "Time of year when the dyestuff is collected perhaps most influences the final color. The amount of moisture during a season, the number of daylight hours, and the type of soil where the plant grows are also factors that will affect its dye properties. Generally, parts of the plant above ground need a lot of sunshine to produce strong dyes. Barks may be an exception."

A dye substance information chart lists the common name (but not the Latin name) of each plant, the part of the plant required, the time of year for harvesting.(in northern hemisphere temperate zones), and methods of preservation. A color information chart lists the proper cloth to use, the color, the proper mordant (a chemical added to prevent fading), and the relative performance of the dye. There is a bibliography and an index.

Natural Plant Dyeing, Disk 25, File 33-795, 64 pages, by Brooklyn Botanic Garden, 1973, out of print; replaced by Dyes from Nature, 1990, $10.20 postpaid from Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, New York 11225, USA.

A collection of short articles on natural dyeing in different parts of the world. Most directly useful are the color pages showing a simple test for color fastness, and the color effects of using different mordants with a single plant dyestuff. The discussion of the chemistry of dyeing provides some helpful insights, and the material on classroom dyeing will be useful for science classes.

Dye Plants and Dyeing, **Disk 25, File 33-791**, 100 pages, by Brooklyn Botanic Garden, 1964, $3.95 plus $3.25 shipping (add sales tax in New York state) from Brooklyn Botanic Garden, I000 Washington Avenue, Brooklyn, New York 11225, USA.

Here are a general introduction, 35 recipes, and details on plants used for dyeing in 20 countries around the world.

Tintes Naturales, book, 90 pages, by Hugo Zumbuhl, 1984, $8.00 from Sepas, Apartado 53, Huancayo, Peru; or $40.00 from SKAT.

Written in Spanish, this well-illustrated natural wool dyeing manual is a remarkable attempt to better communicate with the campesinos of the Peruvian Andes. Samples are included of chemicals used to make the plant dyes more permanent; there are also drawings and real samples of native plants and insects along with small tufts of the dyed wool that give a clear indication of the colors achieved. The quantity of plant material and the recommended method of dyeing are given for each plant/color combination Wool preparation before dyeing is also discussed.

Dyeing and Printing: A Handbook, Small-Scale Textiles Series, **Disk 25, File 33-813**, book, 66 pages, by John Foulds, 1990, £5.95 from ITDG.

A clearly written, well-presented, practical introduction to textile dyeing and printing on a cottage industry to small industry level. This book covers preparation, dyeing and printing of wool, silk, and cotton, and suggests simple ways to test color fastness during washing and fading in sunlight. Explanations of the common technical terms used in dyeing are included. There are good illustrations of workplace layout and simple machines that can greatly improve quality and productivity, such as block printing tables, screen printing tables, and dyeing machines..

The Backyard Dairy Book, **Disk 24, File 33-773**,128 pages, by Street and Singer, 1975, Prism Press, out of print.

This book was written to encourage small-scale home dairy production in England, using goats and cows. Briefly looks at breeds, feed and housing requirements, and milking. Most of the book is on home production of dairy products from milk: cream, butter, cheese and yogurt.

Traditional Cheesemaking: An Introduction, **Disk 25, File 33-815**, book, 83 pages, by Josef Dubach, 1989, £6.95 from ITDG.

Despite the title, this is really a well-illustrated guide to producing modest quantities (e.g., 600 liters/day) of cheese in a small, possibly rural, cheese factory.

"Traditional" here really refers to the basic principles of cheesemaking, which are nicely covered. This book will give entrepreneurs and project managers an excellent idea of what is involved in creating a small-scale cheese factory.

"There are several factors to be considered before deciding on the best location for a cheese factory. Due to production costs, cheese protein is more expensive than meat protein. It is advisable, therefore, to locate cheese factories in remote areas where milk distribution costs are high and demands are low. Siting cheese factories in heavily populated urban areas is less important, as fresh milk can be transported easily and cheaply and is always in demand, especially by children for whom it is a better source of nutrition than cheese.

"In remote areas, cheesemaking can be the best way to overcome the problem of milk overproduction. By converting milk into cheese during periods of peak production, its nutritional value can be conserved and stored until needed, although it should be remembered that cheese cannot be kept forever, under normal circumstances. Economically, rural rather than urban locations are more suitable for cheese factories."

The Village Texturizer, **Disk 25, File 33-788**, booklet, 76 pages, by the Meals for Millions Foundation, 1977, VITA, out of print.

This hand-operated device was adapted from a Korean design used by street vendors to make snacks from sweet potato pellets. This modified version created texturized food products from high-protein, low-fat flours (from legumes such as soy, peanut, or chickpea), seeds, and dried vegetables. The products do not spoil quickly and are easily digested, especially by children. A variety of foods with different protein and calorie levels and suitable flavoring can be produced.

There are good construction drawings and detailed sections on operational costs and nutritional composition of raw materials and end products. "The machine described in this manual is an excellent example of an intermediate technology: construction costs are low (it can be built with pieces of metal and old auto parts for roughly $50); operation is labor-intensive; it requires no special knowledge (only experience) to operate and a minimum of maintenance; it can produce a wide variety of products which are both highly nutritious and tasty; and it can be used in a variety of situations from home to small business.

Yay, Soybeans!, **Disk 25, File 33-789**, pamphlet, 36 pages, The Farm, 1976, out of print in 1985.

Soybeans are converted into a wide array of nutritious and exotic foods in the recipes of this stimulating booklet: soymilk, soycheese, soy ice cream, soy yogurt, and many others. Recipes and techniques are detailed, delicious, and simple. The information comes straight from the mouths and stomachs of The Farm, a rural community of young American vegetarians living on a solid rice and beans diet in Tennessee.

The Book of Tempeh, **Disk 24, File 33-775**, book, 160 pages, by William Shurtleff and Akiko Aoyagi, 1979, $11.95 from WEA.

Tempeh is a high-protein Indonesian food made from soybeans through a 24- 48 hour fermentation process. The bean patties formed are fried until crisp and golden brown; the flavor and texture has been compared to fried chicken and fish.

Soy tempeh contains approximately 19.5% protein (this compares to beef at 20% and eggs at 13%). Tempeh is also the "world's richest known vegetarian source of vitamin B12, one of the ingredients most often lacking in vegetarian diets." This book contains illustrated instructions for making tempeh and tempeh starter, including adaptations to fit U.S. conditions (e.g. use of an electric light bulb inside a Styrofoam cooler for an incubator). Also described are the techniques used in an Indonesian tempeh shop. Only simple kitchen equipment, soybeans, and some home-made starter are needed. 130 recipes.

Cane Sugar: The Small-Scale Processing Option, Proceedings of a Joint ITDG/ IDS Conference, **Disk 25, File 33-810**, book, 230 pages, edited by Raphael Kaplinsky, 1989, £25.00 from ITDG.

Few small-scale industrial processing systems have been so thoroughly studied and adapted as cane sugar production. This reference is an exploration of the advantages and disadvantages involved in small-scale cane sugar refining, and the pieces of technology (such as open pan sulphitation) that can make small-scale production an efficient choice. Issues of scale and the

relationship to the surrounding farming community are relevant to other agricultural processing industries as well. "Small-scale" here refers to units that process 200 tons or less of cane per day; not to be confused with village-level cane processing and sugar production.

This book consists of a well-selected set of conference papers, knitted together with introductory and summary chapters that review technical, financial, economic, social and policy issues.

Community Canning Centers: A Project Profile in Community Economic Development, **Disk 25, File 33-803,** report, 54 pages, by Stephen Klein, 1977, Center for Community Economic Development, Washington, D.C., out of print.

Small-scale community canning enterprises, many of them owned on a cooperative basis, have existed in the United States for most of this century.

Canning (the preserving of foods in tightly sealed tins or jars) has long been a part of rural self-reliance, as farm families saved their own harvest-time surplus for consumption through the rest of the year. Relatively low-cost community-scale canning technology was developed in the 1930s, and thousands of government-subsidized canning centers were established in the effort to increase food supplies during World War II.

This report is a comparative survey of 16 community canning centers, most of which are cooperatively owned, producing from 7,000 to 12,000 quarts of food per year. The centers use glass jars and/or tin cans, and most of the equipment is hand-operated. Users are involved in the canning process, and locally-grown produce is processed for local consumption.

Whether or not a community canning center is a viable proposition in the U.S. depends on local conditions and initiative, as well as cost and availability of different types of equipment. Key choices for any center include production for personal use or for commercial sales, use of tins or jars, and self-service or staff-service food processing. The author discusses the different combinations of these variables and finds a surprising variety of strategies. "The combination (jars, self-service processing, commercial sale) occurs in upper New England at the Gardens for All Community Canning Center in Shelburne, Vermont. Small farmers utilized a noncommercial, self-service canning center to process products for sale at their roadside stands, taking advantage of the center to can specialty items. Through direct marketing at their stands, they were able to charge a price that was sufficient to cover costs and still leave a fair profit."

Charts of projected monetary costs and savings for hypothetical canning centers are included, along with appendices on regulatory and technical considerations, and how to calculate project costs (at 1977 prices).

Most community canning centers are unable to cover their investment and overhead costs with proceeds from processing and sales. Government and other agencies often provide subsidies, and membership fees are charged. "In reviewing the costs and benefits of community canning we find ourselves asking why it is that towns, counties, states, and various funding agencies continue to build and support community canneries in increasing numbers despite the need for subsidization ...(but) those whose support sustains community canning centers understand that in community economics, profits involve more than a direct dollar inflow. The benefits of community interaction, increased self-reliance, better quality food, and skill building, plus monetary savings for families and added stability for area growers, are vital enough social reasons to far outweigh the costs of the initial investment and the ongoing subsidization."

Due to the costs of processing equipment and glass or tin containers for the food, community canning centers are not likely to be feasible and appropriate in the poorest countries.

Small-Scale Mining: A Guide to Appropriate Equipment, **Disk 25, File 33-814**, book, 110 pages, by James F. McDivitt, Dennis Lock, et. al., 1990, £14.95 from ITDG.

This is a collection of equipment running from wooden sluices to steel-fabricated earth-moving machines. All of it can be used in relatively small mines, though little of it would be affordable to the smallest individual and family mining operations that are common in many parts of the world. The book covers equipment for "exploration, surveying, sampling, analysis and testing, drilling, alluvial mining, underground mining, sorting, crushing, grinding, processing, materials handling and transportation, pumping, ventilation, power supply and safety."

Small-Scale Gold Mining, **Disk 25, File 33-796**, book, 51 pages, by E.H. Dahlberg, 1984, £4.95 from ITDG.

With the great increase in the price of gold in recent decades, the economic viability of small-scale mining has greatly improved. This volume discusses placer mining with a sluice box in stream beds, a technique that can be carried out by a single worker with a minimum of equipment. Methods for systematically exploring an area are described. It is assumed that these activities will take place in a location in which gold mining historically was practiced.

Stone: An Introduction, **Disk 25, File 33-807**, book, 148 pages, by Asher Shadmon, 1989, £10.95 from ITDG.

Written to encourage the wider use of stone as a material in small industries, this book will give you a better understanding of stone and the tools and techniques that can be used to work with it. The author covers the basic types of stone and their properties, where to find the right kind of stone for a specific purpose, extraction tools for working stone, architectural uses, and industrial production. Building with stone is discussed and illustrated, but a more complete treatment can be found elsewhere. The preparation of millstones is not specifically discussed, but the reader with that particular interest will find some important background information here.

Stone is, of course, almost everywhere, but it is not always put to effective use. This book will aid those who would like to more fully exploit this local material. Many excellent line drawings of tools and techniques, and a well-selected assortment of photos.

Remanufacturing: The Experience of the United States and Implications for Developing Countries, **Disk 25, File 33-808**, book, 103 pages, by Robert Lund 1984, from World Bank Publications, Box 7247-8619, Philadelphia, Pennsylvania 19170-8619, USA.

Entrepreneurs looking for new business ideas will be the most likely audience for this book. "Remanufacturing is the restoration of used products to a like-new condition, providing them with performance characteristics and durability at least as good as those of the original product. Through a series of industrial processes, worn-out or discarded products are completely disassembled ... cleaned and refurbished, new parts are provided when necessary, and the parts are reassembled and tested to produce units meeting new product performance standards."

In developing countries, the economic incentives for repair and reuse exceed those in industrialized countries, and a great deal of equipment is kept running for many years. There is probably a greater amount of ad hoc, innovative repair and less institutionalized remanufacturing. The result is that the performance of equipment deteriorates over time compared to its performance were it fully remanufactured.

The main unexploited opportunities for entrepreneurs in developing countries to establish remanufacturing operations probably consist of small niches that correspond to the varied sources and ages of the equipment in use. This book may help the entrepreneur to think productively about the niches that are likely to be available locally.

One important concern is the technological stability of the product, as a remanufactured unit may be ten years older than the current models. Thus these businesses are concentrated in product areas where the life span of the individual unit is short relative to the technological life span of the product. In the U.S., the greatest activity takes place in automotive parts. There is, however, considerable activity in electronic circuit boards and communications equipment, and recently remanufacturers of copier and laser printer cartridges have appeared.

Work from Waste: Recycling Wastes to Create Employment, **Disk 25, File 33-804**, book, 396 pages, by John Vogler, 1982, £10.95 from ITDG; also available from VITA and TOOL.

This book contains "details of appropriate technologies being employed all over the world to recycle paper, iron and steel, tin, non-ferrous metals, plastics, textiles, rubber, minerals, chemicals, oil, and human and household wastes. All these materials are suitable for labour-intensive processing, often requiring little capital and providing a cash income plus other environmental and community benefits." Also describes how to set up a small waste recycling business. No coverage of organic wastes, or the simple clever "reuse" of materials commonly found in developing countries.

Small Scale Recycling of Plastics, **Disk 25, File 33-799**, book, 94 pages, by Jon Vogler, 1984, £10.95 from ITDG.

Jon Vogler presents a good introduction to the different plastics commonly used and the basic economic evaluation necessary to determine which materials can be profitably recycled. He then provides advice as to which materials are likely to be economically handled, testing procedures to help identify each type of plastic, and processing equipment to transform the material into a form acceptable to the manufacturers of plastic goods. He also describes the chemistry of plastics.