SMALL RUMINANTS
RESEARCH
AND DEVELOPMENT
IN THE NEAR EAST

PROCEEDINGS OF A WORKSHOP
HELD IN CAIRO, EGYPT,
2–4 NOVEMBER 1988
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SMALL Ruminants Research and Development in the Near East

Proceedings of a workshop
held in Cairo, Egypt, 2-4 November 1988

Editor: A.M. Aboul-Naga

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PLANNING REQUIREMENTS FOR EXECUTING SMALL RUMINANTS DEVELOPMENT PROGRAMMES

A. W. QURESHI

FAO, Rome

INTRODUCTION

The 26 countries of the Near East region, listed in Table 1, raise some 24 percent of the world's goats and 20 percent of its sheep. A large segment of the small ruminant population is raised under extensive conditions in desert ranges and marginal lands. Intensified production is dominant in countries such as Cyprus and Egypt and fattening operations in Syria and Gulf countries contribute considerably to the meat supply. In most of these countries, sheep and goats contribute a major part to the total red meat production and a large part of rural milk production. However, the small ruminants share in herbivore production is declining in many countries, due to current emphasis on cattle production (Table 1).

The recent upsurge in demand for red meat, spurred by increased income and rapid urbanization is largely satisfied through imports. This has also stimulated indigenous production. Intensified commercial production at various scales has started in many countries. The major problems in sustaining and expanding such operations are of technical nature. The producers and prospective investors do not know of alternate production systems suited to the various situations of pasture, feed supply and market conditions. There is not sufficient input-output data available to devise such systems.

Development of profitable livestock production enterprises requires the establishment of efficient support services for disease control, feed supply and marketing. A technically feasible production system will not be sustained without this development support. The small ruminant research and development programmes must handle all these requirements simultaneously.
TABLE 1

Small ruminants population and the share of its production (%) in the total milk meat produced by herbivores.

<table>
<thead>
<tr>
<th></th>
<th>Sheep (000 h)</th>
<th>Goats (000 h)</th>
<th>Meat %</th>
<th>Milk %</th>
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<tr>
<td>Afghanistan</td>
<td>21 200</td>
<td>20 000</td>
<td>3 000</td>
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<td>Algeria</td>
<td>9 337</td>
<td>14 795</td>
<td>2 142</td>
<td>3 090</td>
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<tr>
<td>Bahrain</td>
<td>3</td>
<td>7</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Cyprus</td>
<td>225</td>
<td>325</td>
<td>210</td>
<td>225</td>
</tr>
<tr>
<td>Egypt</td>
<td>1 878</td>
<td>1 149</td>
<td>1 349</td>
<td>1 583</td>
</tr>
<tr>
<td>Djibouti</td>
<td>370</td>
<td>410</td>
<td>510</td>
<td>500</td>
</tr>
<tr>
<td>Iran</td>
<td>33 500</td>
<td>34 500</td>
<td>14 000</td>
<td>13 600</td>
</tr>
<tr>
<td>Iraq</td>
<td>10 000</td>
<td>8 981</td>
<td>3 300</td>
<td>1 475</td>
</tr>
<tr>
<td>Jordan</td>
<td>565</td>
<td>930</td>
<td>381</td>
<td>439</td>
</tr>
<tr>
<td>Kuwait</td>
<td>125</td>
<td>227</td>
<td>90</td>
<td>325</td>
</tr>
<tr>
<td>Lebanon</td>
<td>150</td>
<td>137</td>
<td>200</td>
<td>460</td>
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<tr>
<td>Libya</td>
<td>4 434</td>
<td>5 550</td>
<td>1 857</td>
<td>950</td>
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<tr>
<td>Mauritania</td>
<td>4 200</td>
<td>3 950</td>
<td>2 430</td>
<td>3 000</td>
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<tr>
<td>Morocco</td>
<td>14 270</td>
<td>14 545</td>
<td>5 750</td>
<td>5 276</td>
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<tr>
<td>Oman</td>
<td>57</td>
<td>213</td>
<td>165</td>
<td>700</td>
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<tr>
<td>Pakistan</td>
<td>18 937</td>
<td>25 826</td>
<td>21 693</td>
<td>30 785</td>
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<td>Qatar</td>
<td>38</td>
<td>118</td>
<td>41</td>
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<td>2 243</td>
<td>3 800</td>
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<td>11 800</td>
<td>15 700</td>
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<td>956</td>
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<td>5 978</td>
<td>5 800</td>
<td>1 052</td>
<td>1 100</td>
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<tr>
<td>Turkey</td>
<td>41 336</td>
<td>40 400</td>
<td>18 763</td>
<td>13 100</td>
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<tr>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Emirates</td>
<td>75</td>
<td>382</td>
<td>198</td>
<td>778</td>
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<tr>
<td>Yemen Arab Republic</td>
<td>1 799</td>
<td>2 553</td>
<td>1 661</td>
<td>1 660</td>
</tr>
<tr>
<td>People's Democratic Republic of Yemen</td>
<td>855</td>
<td>930</td>
<td>1 145</td>
<td>1 380</td>
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Source: FAO Agrostat data

This paper provides a rationale for these programmes, identifies the technical and institutional constraints and describes the research and development requirements from the planning point of view.
RATIONALE FOR SMALL RUMINANT DEVELOPMENT

Potential for Greater Resource Utilization

The livestock pressure on agricultural land (arable land and permanent pastures) varies widely in different Near East countries. Egypt, for example, has no pastures or rainfed lands and livestock pressure amounts to 1.4 large ruminants and 0.95 small ruminants per hectare of irrigated land which is mostly devoted to food and fibre crops (Qureshi, 1985). On the other hand, Mauritania and Somalia raise their ruminant stock on dry rangelands and the livestock pressure per hectare in Somalia is more than five times that in Mauritania.

Except for parts northern Iraq, Yemeni highlands, eastern Mediterranean and coastal strips in northern Tunisia, Algeria and Morocco, all Near East lands fall within arid zones. Vast tracts suffer from a length of plant growing period of less than 75 days and are classified as arid. These lands are not suitable for rainfed crops except for planting browse shrubs and for permanent pastures.

Annual fodder crops in rotation with food and fibre crops or with perennial grasses and legumes constitute basic feed resources for livestock in arable areas. In recent years the exploitation of ground water has also increased considerably in some countries. This has greatly increased the opportunities for intensified commercial production of milk and meat. However, the irrigated areas are now plagued with problems of water-logging, salinity and deterioration of the quality of both surface and ground water. Furthermore, the intensive use of fertilizers and pesticides is increasingly polluting the water resources. These are the problems needing continuous monitoring and control. Furthermore, livestock production will have a secondary claim on the irrigated lands and lands in high rainfall areas.

In spite of the harsh climate, degraded rangelands, the hardy pastorales and the adapted livestock of the region offer large opportunities to increase meat production. Small ruminants are particularly adapted to the prevailing harsh climate. The Awassi, Nejdi, Barbary and Blackhead Somate sheep are excellent examples of adaptation to desert range conditions. With small improvements in feeding and management, they respond greatly with reproductive output and growth.

The vast tracts of arid rangelands and managerial grazing can only be utilized by the indigenous sheep and goats. The substantial sheep and goat population in the region
subsisting on the meagre forage is a valuable resource, and there are large possibilities of improving their productivity mainly by expanding the feed supply in a sedentary or semi-sedentary system. Small ruminants are useful in this respect as they can digest low-quality fibrous roughage and are particularly suited to the requirements of rural producers. Goats occupy an important place in utilizing the shrubs and coarse vegetation of the arid lands. Where almost barren and uncultivable land is the main source of feed and where family labour is available, the goat is the most beneficial animal to be reared.

Socio-economic considerations

Sheep and goat meat is the favoured food of animal origin in the region. Its demand has increased rapidly with increased income. The price of fresh meat has also increased markedly. The meat : feed ratio has become highly favourable. Thus, an attractive opportunity has opened up for indigenous production. Investors are eager to finance meat production and marketing enterprises. However, efficient and sustainable patterns of production have yet to be established.

Sheep and goat raising is an important economic activity in rural areas. It provides year-round employment and absorbs surplus family labour which has very small opportunity cost. Investment requirements are not high from rural standards and the mortality risk is low because of low cost per animal. Increasing the offtake per breeding female increases the net income considerably. The expansion of rural small ruminant flocks and intensification of production has been proved to result in increased rural family income. There is a need to establish efficient patterns of rural small scale production and to support it with the required veterinary and extension services as well as with credit facilities. Small ruminants development projects in many countries are aimed at fulfilling this need.

CONSTRAINTS AND OPPORTUNITIES

Technical

The major objective of livestock development in most developing countries is to intensify production by applying improved technology, in order to increase production from existing systems. This objective may also include devising new production systems based on new technology. An objective that crops up more and more these days is the conservation of land and animal resources. However, this may not
necessarily conflict with the objective of maximizing resource use.

To achieve the above objective, an array of known technologies are usually identified implementation - often in planning sessions. The felt needs of the producers are rarely taken into account. Sometimes the methodology of systems approach in identifying and implementing a technical solution is not known.

Attempts to characterize farming systems, especially the studies conducted by ICARDA (Bahhady, 1987), have demonstrated the variety of problems and potentials of small ruminant production systems in the region. These systems include both the traditional low input/low offtake systems and those utilizing additional inputs of feed resources and technology to increase yields of meat and milk. ILCA experience with such studies also illustrates their complexity and multi-disciplinary nature. Yet, it is necessary to understand the existing production systems and to clearly identify the relative importance of major technical and economic constraints. Otherwise, there could be a danger of devoting disproportionate research and development efforts to pursue certain technologies that appear interesting from the scientific point of view or are appealing to the administrators.

In the Near East, the increasing demand for red meat has generated a drive to increase small ruminant production from rangelands, from rainfed and irrigated land and from feedlots which are often based on imported feedstuffs. This has also attracted investment at various scales. Further investment is being constrained by the fact that the outputs envisaged are not forthcoming. Technology packages and management systems specific to particular situations appear to be missing or incomplete. Appropriate technology packages incorporating the management of health, feeding and breeding of the flocks need to be developed for each production system.

It is now recognized in many countries that the economic climate is favourable to the establishment of intensified production systems based on improving grazing, supplementary feeding and feedlot fattening. However, technological innovations in the present state of art are needed to:

- expand the feed base within the land and water resources available in the rangelands and the arable areas;
- efficiently utilize the imported feedstuffs;
- increase the reproductive output of a flock;
- improve the genetic potential in relation to improved
feeding regime and management system;
- develop management packages to ensure flock health; and
- improve the processing and marketing of products, especially milk.

Institutional

The problems encountered in the application of technological possibilities are mainly organization. The institutional structures usually determine the effectiveness of the disease control, production management advice, input supply, marketing and credit support to the producer. The main institutional deficiency appears to be in providing effective disease control at small holder level and in providing technical support to the producer which results in increased production and profits.

Major difficulties in improving the effectiveness of technical institutions may be listed as follows:

- The educational institutions, both at professional and middle-level, do not adequately emphasize practical training. Whatever the social conditioning of the trainees, a strong practical routine should prepare them for manual work required for livestock production and disease control.
- The extension personnel are often hampered by lack of mobility to reach the producer and by a clear-cut technical programme to extend. The non-staff expenditure of extension and disease control services is in many cases alarmingly disproportionate.
- The capacity to plan and monitor small ruminants development in the livestock departments is limited—mainly due to the lack of trained staff assigned to this task.
- Essential linkage or integration of research and extension services at the farm level are often missing; thus constraining the implementation of a meaningful on-farm research-extension programme.

REQUIREMENTS

Research Requirements

The establishment of appropriate institutional structures is the primary requirement for undertaking development-oriented animal production research. The animal production research groups are found in the universities, agriculture research centers, veterinary departments and sometimes organized in a separate animal production research center. Whatever the institutional structure, the research group
should be able to:

- plan its activities in accordance with the needs of the producer and consumer;
- work in collaboration with all the groups concerned with animal production and health in the country as well as with agronomic research groups; and
- implement the research programme in cooperation with the farmer.

To start with, it is necessary to first characterize the existing production systems in the country and then to determine the various items of research that are necessary to improve this system. For the sake of present discussion, the following distinct systems involving sheep and goats may be briefly mentioned:

- Extensive sheep and goat production in the range and the marginal lands. Various attempts have been made recently to describe this system and its inter-relationship with cereal cropping. Improving rangelands is the central issue in increasing animal productivity from these areas.

- Mixed farming systems in higher rainfall areas incorporating intensive sheep and goat production. The complementarities of animal and crop production in these systems have been often mentioned. But there appears to be a need to generate systemic data to describe the production as well as the economic aspects of this relationship. There appears to be large opportunities for introducing better fodder production and animal husbandry techniques in the higher rainfall areas.

- Specialized production systems such as dairy goats and sheep feedlots. Major challenges in improving these systems are to find more adaptable management procedures, especially to reduce dependence on imported inputs.

While identifying the research needs of each of these systems, it is important to consider the possible cost-benefit of various innovations envisaged. Such a pre-testing analysis is usually necessary since most problems in improving a production system are site-specific, have known solutions and call for verification trials rather than experiments to generate new knowledge. Experience in developing countries has shown that trials and demonstrations on producer holdings yield larger benefits than those from research efforts at experiment stations directed towards generating new technologies.
The 1986 FAO Technical Consultation of the Near East Regional Cooperative Research and Development Network on Small Ruminants (FAO, 1987) identified four priority areas of research and recommended the respective collaborative research projects for the participating institutions. These areas of research are described below. It is pointed out that these priority areas were identified from the viewpoint of generating the required data for extension work and for investment follow-up.

Research Project 1. Improving the reproductive output of indigenous sheep and goats

The potentially valuable indigenous genetic resources must be adequately evaluated. This evaluation should be under the environmental conditions most likely to apply in the flocks and herds of producers. Exotic genotypes and crosses of exotic and indigenous breeds should be compared contemporarily with indigenous types in the same environments to determine which best fits the producer's needs. The level of nutrition should always be specified when reproductive traits of different genotypes are described.

Traits and procedures for this evaluation process should be standardized. A minimal standard set of traits should be identified. This minimal set should be practical for collection across sites but sufficiently comprehensive to indicate genetic differences in productivity. The reproduction complex of traits may include sexual maturity, length of breeding session, interval between parturitions, litter size born and weaned, etc. These traits are relatively simple to observe and indicate both fitness and productivity potential. The importance of reproduction was further illustrated by results from experiments with D'Man and Chios-regional breeds noted for high prolificacy. These breeds have particular potential for increasing meat yields from more intensive systems. However, the caution was raised that high levels of prolificacy are rarely appropriate to extensive, range-based systems.

The following priority areas of research were identified under this project:

- Seasonality of local breeds of sheep and goats either male or female and the way of utilizing their potentiality as non-seasonal breeds (identification of appropriate mating seasons on yearly or eight-monthly mating cycles).
- Evaluation of genetic potential of high-fertility local breeds of sheep and goats which could be of benefit to
Investigating constraints in the reproductive output of local sheep and goats with emphasis on their mothering ability.

- Genetic improvement for fertility:
  a) selection for fertility in the promising local breeds;
  b) crossbreeding with regional breeds (Chios and D'Man) and temperate breeds (Finn and Romanov). Evaluation of adaptation of exotic breeds and crossbreeds.

Management practices to improve the reproductive output of local sheep and goats:
  a) on-farm trials are recommended to validate the results of experiment station research on each topic before they are widely applied;
  b) standardization of methodologies for evaluating reproductive function on the farms is also needed.

Research Project 2. Strategic feeding and nutrition of small ruminants

It is necessary to determine the nutrient supply from the various forage and feed resources as well as their seasonal availability in order to design strategic feeding systems and, where necessary, to adjust the breeding cycle to the cycles of seasonal nutrient availability. Various attempts at inventorizing feedstuffs in the Near East have indicated that a variety of feedstuffs are currently underutilized especially those that are non-conventional. These feeds are crop residues, agro-industrial and slaughterhouse by-products and feeds from animal origin. All of these have their potentials and shortcomings. The fibrous feeds can be improved in nutritive value by supplementation and by chemical treatments especially urea. Among the animal excreta, poultry litter offers a valuable protein source, which is of particular advantage when used in silage production using agro/industrial by-products such as citrus, olive or grape residues.

The objective of devising strategies for feeding should be to increase per animal productivity from utilizing available feed resources. Research in this direction should involve feeding trials incorporating various feedstuffs in balanced rations. Emphasis should be placed on making use of the potentially more valuable feeds which can be combined to form balanced diets. The usefulness of NPN, minerals and vitamins in supplementary feeding should also be determined.
The following priority areas were identified:
- The feed resource base should be studied thoroughly and be extended to include the utilization of underutilized feeds, especially non-conventional feeds.
- Assessment should be made of the types of feeds produced, their value in quantitative and qualitative terms, intake, digestibility, nutritive value, acceptability and inherent limitations, for example, toxic factors.
- Strategic supplementation was particularly important for the prevailing extensive, semi-intensive and intensive systems of production, this could be energy, protein, minerals or vitamins or combinations of these. The appropriateness of supplementation needs to be identified with the product (meat, milk or fibre).
- That feeding strategies and improved feeding systems should be tested especially on-farm to demonstrate value and cost effectiveness.

Research Project 3. Improvement of goat milk production

Meat is the principal product from sheep and goats in the region, but the value of dairy products and fibre is also substantial. In the region, sheep and goats generally serve dual, often triple purposes. However, the considerable value of milk and fibre from small ruminants remains unrealized because of poorly organized and inefficient collection, processing and marketing of these products. Milk yield is an important trait in subsistence production but in commercial production for cheese total solids yield (fat + protein) is an important consideration.

The use of dual-purpose Damascus or Shami goat for up-grading the Baladi types should be considered in arid areas. For commercial milk production crossbreeding with high-yielding European breeds may be undertaken.

The following items for research were specified:
- Evaluation of milk production potential of local breeds and evaluation of crossbreeding programmes. Estimation of milk production immediately after birth should be included in data collection.
- In commercial dairy goat herds, the effectiveness of early weaning should be determined. The cost-effective animal health management systems should be devised for these herds.
- Management packages for small herds including those for tethered goats should be identified and tested on farmer's holdings.
- Early weaning and fattening of kids as means of increasing milk and meat production.
Research Project 4. Studies on small ruminants production within farming systems

Small ruminants have a major role in balanced agricultural systems, especially for small-scale farmers. Thus, priorities for research and development to improve small ruminants should be set in the context of the inputs to the overall system. This systems approach involves the principal steps: characterization of the system including resource inputs, product outputs, operational processes and interactions; analysis of systems to identify constraints and practical options for their resolution; design and evaluation of interventions to existing systems; and implementation of technically, economically and socially feasible interventions by producers.

The items for research and development may include provision of adequate nutrients throughout the year, development of low-cost herd health management, productivity of indigenous genotypes, development of market infrastructure, analysis to support policy development to promote sheep and goat production and provision of credit assistance to producers. Computer models of sheep and goats used to stimulate alternative production systems may also be used to identify the technical as well as economic importance of technical interventions envisaged. Priority items are as follows:
- Whenever possible, proposals should be prepared to conduct simplified studies on small ruminant production systems from the viewpoint of identifying research needs of economic importance.
- Interested institutions should liaise with international research centers to plan and carry out these studies and technical assistance should be sought whenever needed.
- On-farm trials should form the integral part of research on the items specified for Research Projects 1, 2 and 3.

Development Requirements

Effective linkage of research, extension and training is the most important requisite for developing and introducing improved technologies which the producer can use. In order to utilize the results of empirical research for small ruminants development it is necessary to harmonize market forces, incentives, policy making and research with training and human development of the producer. The process of generating research results must be effectively linked with other developmental elements. The producer must be involved in identifying research problems as well as in the verification of promising research results generated at experiment stations. Furthermore, research stations should
be fully involved in the process of technology transfer.

Improving and expanding sheep and goat production in rural areas requires local organizational base to channel the required services and credit. This has proved to be the most difficult aspect of the development process. Yet, there are some success stories of small-scale sheep and goat farm development in the region, e.g. the rural sheep development programme in Egypt (Aboul-Naga in FAO, 1987), the sheep and dairy goat project in Cyprus (Economides, 1987), the range and sheep cooperatives in Syria (Draz, 1983), dairy goat project in Tunisia (Mahjoub, 1987), and the goat farm development in Oman (Qureshi, 1988).

Various attempts have been made to establish an organizational structure that would ensure the provision of all the required inputs and services to the smallholder. In Syria, a National Feed Revolving Fund controlled by a Committee headed by the Minister provides credit for feed and farm development in coordination with the Ministry and the General Feed Organization. Omani goat farm development project is a good example where a whole array of organizations provide funds or technical support through the Project Supervising Committee. In the Tunisian dairy goat development project all the required inputs and services are integrated under one direction. In Egypt and Cyprus, the research institutes appear to be spearheading the development programmes. The experiences of these five countries are valuable in designing future programmes.

International Cooperation

Technical cooperation among developing countries (TCDC) is a widely accepted principle and a useful and expeditious mechanism to bring about a desired technological change in production systems common to a group of countries. Support for TCDC has been voiced in many FAO meetings and conferences involving Near East countries. However, the identification of specific problems in accordance with the felt needs of the countries and inadequate support for the coordination mechanism have been the major factors that have impeded the proliferation of TCDC activities on animal production in the region.

The Network approach being followed by FAO is designed to foster international technical cooperation. Actually, networks are a follow-up of traditional assistance provided by FAO, adapted to a new regional reality, characterized by a smaller flow of external resources and a greater availability of national knowledge and experiences which may be exchanged among the countries of the region. In October
1984 a "Regional Expert Consultation on Small Ruminants Research and Development in the Near East" was held in Tunis to discuss the relevant research and development activities in Member Countries and to identify current priorities in the Region for the various activities required to establish appropriate production systems involving sheep and goats. The Expert Consultation recommended the establishment of a "Regional Cooperative Research and Development Network on Small Ruminants". The First Session of the Near East Commission on Agriculture, held in Cairo in March 1984, endorsed the recommendations of the Expert Consultation and the Eighteenth FAO Regional Conference for the Near East, held in Istanbul in March 1986, urged Member Countries to participate in the Network through appropriate national research and development institutions.

The First Technical Consultation of the Network was held in Rome in October 1986. It was attended by the Network focal-point scientists nominated by the Governments of Cyprus, Egypt, Iraq, Pakistan and Tunisia. Other participants included three scientists from European Sheep Network; observers from ILCA, IDRC, USA and F.R. Germany and FAO staff members.

The technical Consultation discussed work plans to participate in the Network as proposed by the designated institutions in the interested countries. The research plans are expected to be systems-oriented and aimed at generating data required for the purpose of extension and investment follow-up. TCDC-styled arrangements were discussed to operate the Network largely through national manpower, institutional and financial resources. The collaborative research work to be carried out through the Network was also discussed together with other cooperative activities of the Network including training courses, study tours, publications and biennial technical meetings.

REFERENCES
