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IRAQ PRIVATE SECTOR GROWTH AND EMPLOYMENT GENERATION

July 23, 2006

Small Ruminant Animals in Iraq

IZDIHAR
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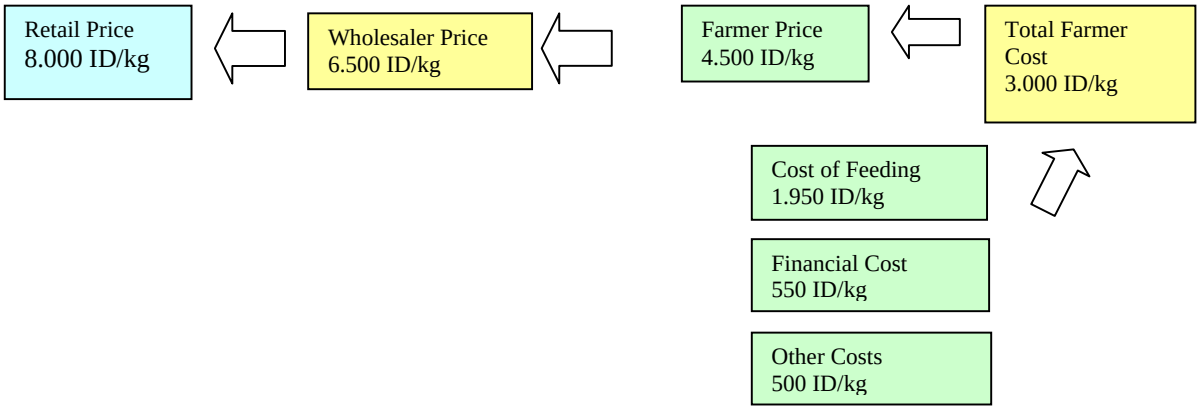
INTRODUCTORY NOTE

Small Ruminant Animals in Iraq -- as was *Business Models for Aquaculture in Iraq,* April 25, 2006 – is a study aimed at supporting local microfinance activities in Iraq at the local level, rather than being a comprehensive analysis of sheep and goats in the country. Its objective is to support people involved in promoting lamb fattening and in developing alternative supplemental sources of animal feed such as cactus, vicia sativa, and feed blocks. In contrast to *Sheep Production Improvement Program* by Ardi, April, 2005 – a study focused on productivity also supported by USAID -- this paper analyses the value chain and provides a quick, easy-to- read document for decision makers supporting local lamb fattening operations.

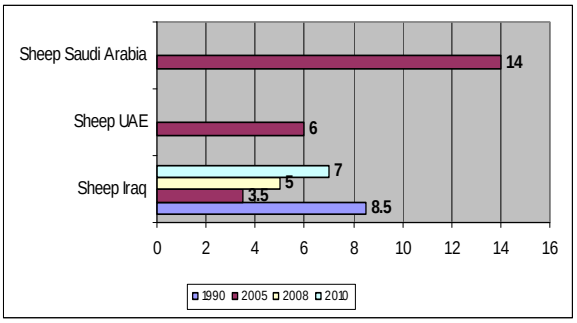
EXECUTIVE SUMMARY

In many ways the sector of small ruminant animals - sheep and goats - is neglected in Iraq, attracting little interest and investment from the government, and marginal attention in leading agricultural programs. Sheep are normally raised for meat and goats predominantly for milk. Our analysis will focus on sheep, numerically and economically much more important than goats. There are presently in Iraq an estimated 7-8 million sheep and probably only 1.5 - 2.0 million goats. They are raised extensively in the rangelands in the governorate of Ninewa (26%) and in the central Iraqi governorates of Diyala (12%), Wassit, and Thi Qar (8% each) where they are grazed semi-intensively, mainly with supplemental food. Sheep raising could be turned into a strategic sector, contributing to Iraq's exports – through sales to the GCC countries - and thereby creating added value and jobs in Iraq's rural areas.

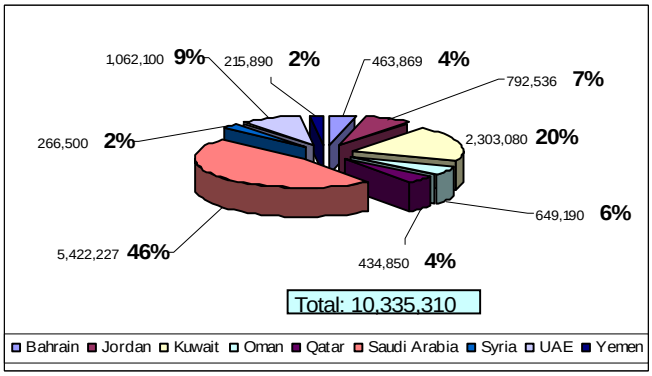
SHEEP VALUE CHAIN



Sheep Meat Consumption: Iraq and the GCC



Middle East: Sheep Imports/year - units



Sheep: Potential in Iraq

Estimated number of sheep in Iraq	8.9 million
Sheep import recorded in GCC	10.3 million heads/year
Sheep feed conversion:	1:1to 8 – 1000g of DM/daily converted into 125g meat
Sheep ADG (average daily weight gain).	100g in Iraq – 220g in Turkey
Sheep daily added value	Sheep eat $0.13 worth of intake – producing $0.42 worth of meat
Lost of meat because of food shortage/low nutritional value	220,000 tons - $800 million per year.
Need for better additional food for additional sheep flocks	300,000 tons/year for an additional 1 million/heads
Potential demand for feed blocks	4,000 tons/day

The demand factors are all extremely favorable: domestic meat consumption of lamb and mutton – now at 3kg per capita – should recover in the medium-term to pre-embargo levels (8.5kg/capita). Imports are strong in the entire Middle East - particularly the GCC, an estimated 10 million heads/year).[1]

Sheep raising provides a remarkable example of a profitable added value chain. Sheep transform an average daily intake of 1kg of forage worth $0.13 into 100g of valuable meat sold at the farm gate for $0.42/kg.

The sheep sector would successfully pass a theoretical market test, an assessment of overall potential competitiveness. It would also pass the development test assessing the industry's potential contribution to Iraq's broader economic development. These two tests are highlighted in Izdihar's Competitiveness Study analysis in Iraq as leading indicators for potential attractiveness to investors.

[1] Following a ban on imported chickens, the average price per kg of lamb jumped in April 2006 from $4 to $8, confirming the inelastic supply of lamb in Iraq.

The sector's constraints have been thoroughly identified and theoretically addressed.[2] A shortage of quality feed supply has been unequivocally identified as the main bottleneck hampering development. Other factors such as a low fertility rate, lack of veterinary services, lack of credit, and the absence of a functioning extension service capable of bridging the gap between researchers and farmers are, in reality, easier to address.

Some solutions to the shortage of quality feed have been clearly identified and recommended in the M&M study conducted by ICARDA (International Center for Agricultural Research in the Dry Areas) and include:

- The introduction of improved barley varieties - high yielding and more salinity resistant;
- The adoption or expansion of cultivated land for forage legumes *(Vicia Sativa)*;
- The adoption of Vetch and barley crop rotation in the rangelands;
- Urea treatment of straw and stubble to improve nutritional value of feed ;
- Feed block adoption. Feed blocks are a solidified mixture of agro-industrial byproducts such as tomato pulp, date pulp, rice bran, and poultry parts;
- The use of cactus *(Opuntia ficus indica)* plantation in arid rangeland as a potential source of feed and water;
- Re establishment in the rangeland of native fodder shrubs (*Atriplex*) as alternative feed sources.

So far little progress has been made in the implementation of the proposed food shortage solutions. Lack of extension service, credit to farmers, and poor management of collective pastoral resources in the rangelands are widely identified by experts as the main causes. Farmers also seem reluctant to accept innovations which require additional expenditures beyond their limited financial resources. Nevertheless, even with the implementation of such solutions, the gains in productivity would probably be insufficient to cover the potential booming demand for an estimated additional 4 million sheep. New approaches should therefore be investigated.[3]

In this study, two promising courses of action are analyzed and recommended:

1. The creation of semi-intensive sheep-grazing clusters in richer areas with greater resources - higher rainfall and more natural, good quality pasture land available. [4] In such areas, most of the required daily feed intake would be supplied by natural forage – as is the case in Australia and New Zealand. Supplemental feed would be limited. Conceptually and figuratively, that implies the creation of clusters - a "little New Zealand" in Iraq. Areas with such characteristics seem to exist in Iraq especially, in the governorates of Tameem and Erbil, and perhaps also in Salah al Din and Sulaymaniyah.[5]

[2] ICARDA M&M program addressing rangeland degradation, small ruminants feed shortage solutions in the MASHREQ and MAGHREB (Iraq, Jordan, Lebanon, Syria, Algeria, Libya, Morocco and Tunisia).
[3] The estimated potential demand for four million additional sheep is calculated based on a share of 15-20% of exports to the GCC and assuming increases of 50% in the current lamb and mutton consumption in Iraq, representing a partial recovery to pre-embargo levels.
[4] Clusters are geographic concentrations of similar or related firms and institutions.
[5] Based on the results of the M&M ICARDA Study.

2. The massive development of a feed block industry, offering a food supply more easily expandable than could be achieved by increasing the production of crops such as barley that require additional quality land and water.

3. The adoption in the rangelands of a local participatory approach in order to sustain land management and productivity along with community-based micro-credit schemes.[6]

A cluster approach seems particularly appropriate to overcome the shortcomings due to the lack of credit and an extension service. It would promote at the same time a community-based land management system. Likewise, the development of a feed block industry is vital not only to expand the supply of animal feed, but also to create jobs in rural areas, and that with little investment and no risk. A cluster approach with well-thought-out positioning might also prove successful in attracting foreign investment from the Gulf states to a domestic sector that is traditionally undercapitalized.

Another promising area is the link between a sheep fattening system and micro-finance. Micro-finance institutions could provide working capital for the fattening cycle, which averages 5 months, and finance the purchase of feed block by farmers. Lamb fattening provides a risk-free opportunity, is profitable, and is supported by steady consumer demand.

Credit and micro-finance were found to be vital for the expansion of the feed resources suggested in the M&M study, as farmers are reluctant to accept innovations that require additional self financing. In addition, rangeland management should be pursued actively, not only for the sake of productivity purposes but also as a measure to promote land conservation.

The prospects for a leather industry, depend heavily on structural changes in the supply chain: Under the current system of transporting live animals and slaughter in small and medium-sized butcheries, the leather industry has no prospect of achieving economies of scale and the level of competitiveness required to compete with Turkey, Pakistan, and India.

[6] A community approach was successfully used by Icarda in the Oudja community of Morocco for example.

INTRODUCTION

Small ruminant animals – sheep and goats - are an important source of income in western Asia and North Africa, semi-arid areas with less than 300 mm average annual rainfall. This is mainly because they require low initial capital and maintenance costs and use marginal lands and crop residues - otherwise of little or no value – to produce milk and meat. Nevertheless, despite their importance, small ruminants usually receive relatively little attention from research workers in the WANA region, and the sector is often neglected by the main agricultural programs. Iraq is no exception.

Only recently, more attention has been paid to small ruminants because of their ability to produce meat and milk even in hostile environments, their resistance to harsh conditions and disease, and their capacity to generate additional income in poor rural areas are increasingly appreciated.

The most important contribution to the small ruminant sector in Iraq came from the Program for the Development of Integrated Crop/Livestock Production in the Low Rainfall Areas of WANA (Western Asia and Northern Africa) started in 1995. The program, aimed at improving sheep and goat productivity in Iraq and other MENA countries, was implemented by ICARDA in collaboration with the International Food Policy Research Institute (IFPRI). It was funded by the Arab fund for Economic and Social Development (AFESD) and the International Fund for Agricultural Development (IFAD). [7] The program, concluded in 2002, provides a comprehensive analysis of the small ruminant animals in Iraq and identified both the main constraints and solutions afflicting the sector. The ICARDA final report clearly identifies the shortage of quality feed as the main constraint for a development of sheep and goats sector in Iraq. The shortage of feed seems to be the result of poor management and conservation of rangelands (overgrazing) and the lack of application of the proper conservation crops and technique by farmers. Other constraints such as low sheep fertility and a lack of veterinary services are also highlighted as important, although not as significant as the poor feed issue.

Until now, little progress has been made in improving small ruminants sector. It remains a neglected and marginalized sector in Iraq, widely unrecorded, with little funding, and largely absent from most of the strategic agricultural plans. Nevertheless, there are good reasons to consider the sector as highly strategic in Iraq and a strong candidate to provide profitable and sustainable exports to the region. Our analysis will focus on sheep because of their numerical importance and commercial relevance compared to goats.[8]

The added value sheep could provide to the rural Iraqi economy is significant: On average a sheep transforms 1 kg of daily feed intake, worth on average $0.13, into 100g of meat worth at least $0.40-0.45. In many respects, the sheep sector seems endowed with a Midas touch that other more heavily subsidized sectors of Iraqi agriculture do not have.

[7] International Center for Agricultural Research in the Dry Areas

[8] Reportedly, sheep in Iraq outnumber goats by 5 to 1 and are commercially more important, accounting for 95% of small ruminant exports, and 85% of the small ruminant meat consumed domestically. Goats are predominantly used for milk (self consumption).

Based on the criteria of the Competitiveness Analysis, developing the small ruminants sector would be both attractive and desirable in today's Iraq:

- It creates jobs, especially in poor rural areas where few alternatives are available;
- It encourages regional economic growth;
- It is compatible with the adoption of a model based on small- and medium-sized enterprises (SME's).
- It has potential cross-cutting benefits, with clear positive effects, on other sectors of the economy such as forage and grain production, leather processing, and on dairy production, in addition to trade and export related operations.

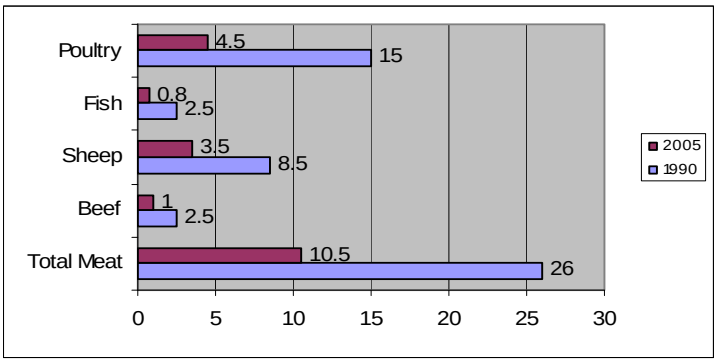
This sector also passes the competitiveness test: On the one hand Iraq seems to have the potential to become a competitive player in the Middle East region and, on the other hand, there is no significant regional exporter of sheep. Animals are actually imported in significant quantities from countries as diverse as Australia, New Zealand, Ethiopia, and Somalia.

1. THE DEMAND FOR SMALL RUMINANT ANIMALS IN IRAQ AND THE MIDDLE EAST

1.1 The Demand for Lamb and Mutton in Iraq

Lamb and mutton consumption is traditionally important in Iraq, where it is widely preferred to beef. Lamb and mutton consumption per capita is almost as important as poultry – despite much higher retail prices – and far greater than fish.

Iraq 1990-2005: Meat Consumption kg per Capita/Year

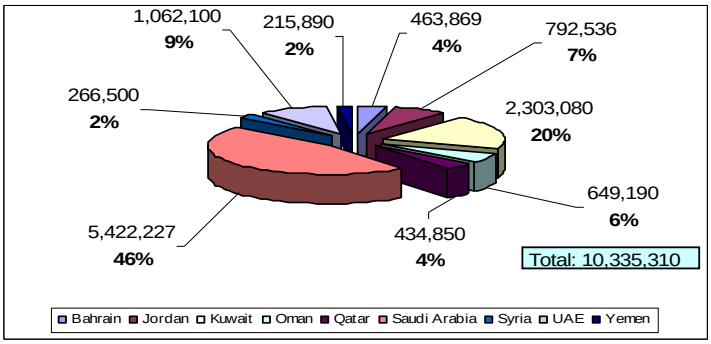


Consumption of lamb and mutton has fallen drastically over the last fifteen years, but is likely to recover to the pre-embargo level of 8-10 kg/per capita – a value more in line with regional consumption patterns - once Iraq enters a period of stabilization with a better purchasing power.[9] The additional domestic demand for lamb and mutton could easily reach 200,000 tons in the short and medium terms, a $1 billion market at current wholesale prices.[10]

1.2 The Demand for Lamb and Mutton in the GCC Countries

The export potential for lamb and mutton is equally promising: The GCC countries are all major importers of sheep:

GCC+Syria+Yemen: Total Imports of Live Sheep



[9] Izdihar – Iraq Private Sector Growth and Employment Generation Project: *The Potential for Food Processing in Iraq*, March 15, 2006.
[10] Assuming a partial recovery to pre-embargo level consumption.

Livestock trade in the region is driven by demand from the GCC states, which collectively import some 10,300,000 live sheep per year. In 2004, Saudi Arabia was by far the largest importer at almost 5.5 million head, Kuwait was the next largest with 2.3 million. Imported animals come from as far away as Australia and New Zealand, and also from Pakistan, Sudan, Somalia, Ethiopia, Eastern Europe (Bulgaria, Romania) and to a lesser extent from Turkey, Iran and Iraq.

Detailed information about livestock exports to the GCC is nevertheless not easy to find, since a substantial proportion of this flow avoids and evades detection at conventional checkpoints, border crossings, ports and airports. Clandestine movements across unmarked borders in remote areas are difficult, if not impossible, to monitor. Because of that, it is probably fair to assume the real import-export trade of sheep (and to some extent goats) in the region widely exceeds official statistics.

Historically, meat consumption is high across the region, with an estimate of 43kg/year per capita in Saudi Arabia and 73kg in UAE. Australia is without question the biggest exporter of live sheep to Middle East and GCC, followed by New Zealand.

Australia 2005: Live Sheep Export to the GCC

SHEEP EXPORT - HEADS		
Bahrain	465,000	9%
Jordan	587,564	11%
Kuwait	164,000	3%
Oman	481,484	9%
Qatar	308,369	6%
Saudi Arabia	3,420,000	63%
Total	**5,426,417**	**100%**

MLA – Australia, 2005

In addition to their position as exporters of live animals, Australia and New Zealand also monopolize the export of frozen and chilled lamb and mutton to the GCC respectively with 40,000 tons (live sheep equivalent – LSE – of 1,905,000 sheep) and 17,500 tons respectively.[11]

Demand for sheep in GCC – as in most of the Muslim countries – varies over the course of the year, peaking during religious festivals. During Ramadan, believers must fast during the day, but the evenings are dominated by celebratory meals. The end of Ramadan is celebrated by a three-day holiday period when gifts are exchanged and friends and family gather together for large meals. Lamb and mutton are popular choices. A second festival, *Eid ul Adha* (Feast of Sacrifice), is celebrated on the tenth day of the month of *Zul-Hijja*, a few months after Ramadan, when those who can sacrifice a sheep.

[11] Based on an LSE of 21kg/carcase.

GCC Countries: Meat Consumption kg per capita

Saudi Arabia	Chicken	Sheep	Beef	Total	**UAE**	Chicken	Sheep	Beef	Total
1998	31	**7**	3	41	**1998**	42	**21**	11	74
1999	33	**7**	4	44	**1999**	51	**19**	10	80
2000	36	**7**	4	47	**2000**	52	**17**	8	77
2001	34	**7**	4	45	**2001**	49	**14**	8	71
2002	36	**6**	4	46	**2002**	55	**14**	7	76
2003	33	**6**	4	43	**2003**	50	**14**	7	71

Middle Easterners also have a clear preference for “fat tail” sheep such as the Iraqi *Awassi,* and are prepared to pay substantially more for these than for *Merinos, the* species usually exported by Australia. Since 1993, Australia has developed a crossbred *Awassi/Merino* which suits the Middle East market better, but it does not enjoy the same acceptance as the indigenous breeds.

Iraq - for its lack of an efficient cold chain - cannot compete in frozen sheep meat with Australia and New Zealand, but it could capitalize on the desirability of fat tail sheep such as the *Awassi*. Iraqi *Awassi* sheep enjoy a very positive image among GCC consumers and command a considerable price premium compared to the Australian *Merinos*. Furthermore, the export of live animals from Australia to the GCC is a complicated and inefficient operation with endemic problems as happened in August, 2003 when the notorious ship *MV Como Express,* with 57,000 sheep, was stranded for weeks at sea after the shipment was rejected by Saudi authorities.

2. SMALL RUMINANTS IN IRAQ

2.1 Sheep and Goats in Iraq: Market Size

In the aftermath of the Gulf war in 1990-91, subsequent sanctions, and the current geo-political crisis, it has been difficult to find any credible information about the status of Iraq's livestock resources. The table below summarizes the extent of sub-national information obtained and is confined to the distribution of Iraq's sheep population by Governorate. No data are available for goats.

Iraq: Number of Sheep by Governorate 1999 (FAO – Hannan Mohammed)

Region	Area km2	Sheep	%
Anbar	86,819	82,890	**1%**
Basrah	17,818	65,300	**1%**
Muthanna	51,959	333,500	**4%**
Qadissiya	8,910	434,900	**5%**
Sulaymaniyah	15,852	323,700	**4%**
Babylon	6,935	258,500	**3%**
Baghdad	5,254	98,400	**1%**
Dahuk	9,988	126,100	**1%**
Thi Qar	14,035	718,200	**8%**
Diyala	18,347	1,111,422	**12%**
Erbil	14,762	348,800	**4%**
Kerbala	56,415	282,000	**3%**
Tameem	7,800	479,200	**5%**
Missan	16,848	414,500	**5%**
Ninewa	39,197	2,335,100	**26%**
Wassit	17,407	715,700	**8%**
Najaf	27,609	111,400	**1%**
Salah al Din	20,541	654,100	**7%**
Total	**436,496**	**8,893,712**	**100%**

ICARDA estimates are a little more conservative: Some 6.5 - 7.5 million sheep and approximately 1.5 - 2.0 million goats, but the data confirm the pattern of distribution by governorate indicated in the table above. According to other sources, there are as many as 20 million sheep in Iraq, but this number seems inconsistent with both meat consumption and the supply of forage and feed in the country.

2.2 The Market for Sheep and Goats in Iraq: Structure and Value Chain

Sheep and goats are the main type of livestock in areas with annual rainfall less than 300 mm. Native pasture is used primarily for grazing small ruminants. Generally, there are no specific property rights in the rangelands, and flock owners have open access, at approximately one sheep per hectare. Native pastures are grazed mainly in spring and rarely support livestock for the whole year.

There are four distinct types of animal production in Iraq:

- Smallholder village systems in crop-livestock areas where most farmers have less than 100 sheep that graze on pasture and crop residues. Flocks of sheep and goats are grazed extensively on natural vegetation in communal rangelands in the foothills, mountains and steppe in the spring. During summer, small ruminants depend mainly on cereal crop residues from stubble grazing, with little or no supplement. In winter, they are generally fed with straw (tibin) and barley grain.

- The household system, where sheep and goats are kept near the house to provide milk for the family. Usually productivity is extremely low, as most farmers are more concerned with minimizing costs and risk rather than maximizing profits.

- The lamb-fattening system where lambs are fattened for three months, from the age of 4-5 months (18-20kg), until slaughtered at 40kg. This is usually a seasonal, commercially oriented trade, associated with the Haj and other festivals.

- The modern semi-intensive system based primarily on supplemental feed.

Extensive grazing in rangeland predominates in the Ninewa governorate, where flocks are large - 5-6,000 head - and in Muthanna, while the semi-intensive system with supplemental food, prevails in Wassit, Diyala, Missan, Thi-Qar, Babylon and Qadissiya where average flocks are smaller – 100-200 head. In Salah al Din and Tameen extensive system in rangeland coexists with semi-intensive grazing.

Sheep are essentially raised for meat, while milk, because of the high total solids content, is usually converted into cheese and sold locally. Average sheep lactation is extremely poor in Iraq, often as low as 0.8 liter/day at 150 days/year.[12]

Goats are mainly used for milk although goat meat is available in most markets and frequently sold as sheep. Goats have in fact a worse feed conversion rate than sheep but better lactation, reaching in some cases 2.0 liters/day.

Both sheep and goats are usually sold live by farmers to wholesalers and retailers. Slaughterhouses are hardly operating. Wholesalers control the market, providing credit to farmers - with average interest rates close to 40% on an annual basis – and operating with higher gross margins than retailers (35 - 40% vs. 15%).[13]

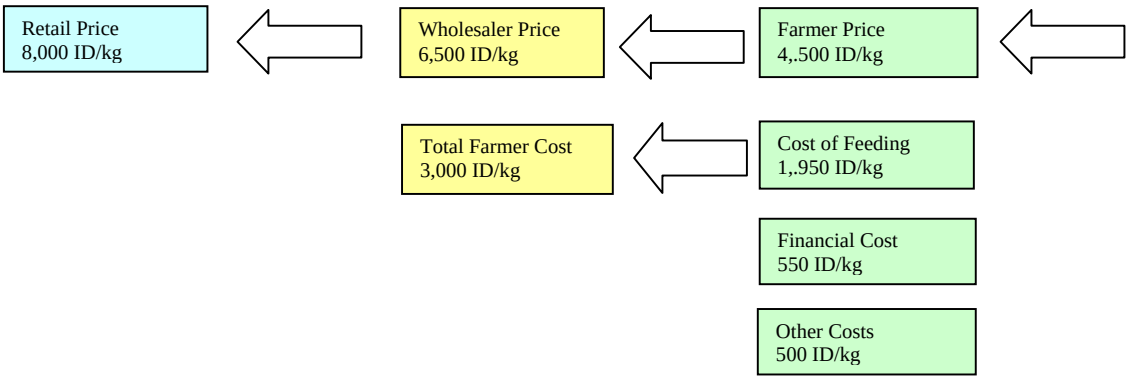
Leather and wool are marginal by-products: The market for wool is small and is basically uncompetitive with imports or imported finished garments, while leather suffers from the absence of slaughterhouses, essential in order to concentrate supply. Butchers commercialize a small quantity of low quality, poorly treated skins currently exported to Jordan. Little or no trade is reported to countries such as Turkey, Italy, India and Pakistan, the biggest sheep leather processors in the world. Turkey, with a market share of 22%, has recently overtaken

[12] Sheep milk total solids content is as high as 19% compared to an average of 12% for goats and cows. Sheep milk fat content – 7.4% on average – is also higher than for goats (4.5%) or cows (3.7%).
[13] Under normal conditions, in most of the MENA countries, wholesalers operate with margins of 15-20%.

Italy as a sheep leather finishing manufacturer. Turkey is currently one of the most important producers of leather garments in the world, with 2,200 companies and exports of $738 million in 2004. The sheep leather industry in the EU25 is concentrated in the industrial districts of Solofra, in Italy, and Barcelona in Spain, which together account for 82% of the finishing and 87% of exports. Spain and Italy focus mainly on sheep leather garments – for which demand has been weakening over the last five years – while Turkey and Pakistan specialize in accessories.

Tanneries in Iraq are reportedly working at 10-15% of capacity and lack any technological edge. Further disincentives to tannery development in Iraq are the high water requirements – on average 1,000 liters/m^2 of semi-processed-crust leather - and environmental pollution.

Iraq: Sheep Value Chain Analysis

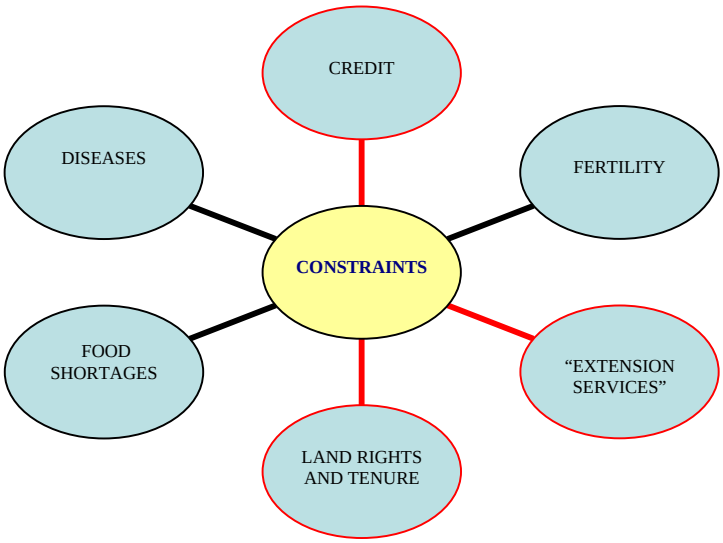


Governorate of Ninewa: Awassi Sheep Grazing in the Rangeland

The fat-tailed *Awassi* sheep is the main breed in Iraq, famous for its meat and ability to tolerate heat, drought, cold, and long treks. *Awassi* lambs grow fast and can reach 20kg live weight at two months. If they are fed concentrates, they can reach 40kg at five months. *Awassi* is also one of the best dairy sheep in the world, producing 1.75 liters/day on average, with a lactation of 200 days/year. The ability to conceive while still lactating is another advantage. *Awassi* is

hardy and requires low maintenance. Besides *Awassi,* other minor native sheep breeds are *Hamdani, Karadi,* and *Arabi.* They are all fat-tail and carpet wool types.

3. SMALL RUMINANTS IN IRAQ: CONSTRAINTS



Technical constraints such as food shortages and fertility have been successfully addressed – in theory - by Program for the Development of Integrated Crop/Livestock Production in the Low Rainfall Areas of WANA (Western Asia and Northern Africa) implemented by ICARDA.

3.1 Food Shortages

Inadequate and poor quality feed - especially during the dry season - is the most serious constraint on sheep production. Even when there appears to be an adequate quantity of vegetation available, its nutrient content, in terms of metabolized energy, digestible protein, and minerals, may be poor. The prospects for the future are not encouraging. According to a recent study by ICARDA, feed deficit – ceteris paribus – is expected to double every ten years in response to the increasing population.

In today's Iraq, sheep production has become highly dependent on the availability of crop residues, food processing by-products and supplemental feed (barley, wheat bran, straw). The contribution of natural grazing as a proportion of total feed resources in Iraq has declined from 70% in the 1950s to only 20% at present[14]. Not only are rangeland resources insufficient to meet current demand, but the absolute level of grazing feed is falling due to overgrazing, the removal of vegetation by plowing or for fuel, and soil erosion.

Overgrazing of arid rangeland does not result instantly in defoliated sand dunes, but it can over time. The initial effect of overgrazing is to change the composition of plant species in an ecosystem, since the palatable species are consumed by animals very quickly. When animals are forced to eat even the unpalatable species the grazing continues down to the sand. Rangeland degradation is becoming a serious matter in Iraq, where it is now estimated that

[14] In low cost producer countries like Australia and New Zealand, forage pasture accounts for almost 100% of the sheep feed.

more than 70% of pastoral lands are degraded, and this has serious repercussions for sheep feeding costs. The deterioration of the rangeland as the source of a cheap feed supply is straining the supplemental food production of crops for forage and for grains, already in short supply.

An additional supply of 220,000 tons/year of meat - with a value of $800 million – would be available in a market with adequate animal feed resources. Researchers estimate, in fact, that the average daily weight gain of *Awassi* sheep in Iraq could be raised from current the 100g/day to more than 220g/day.

3.2 Food Shortages Solutions

ICARDA and national researchers in Algeria, Iraq, Jordan, Lebanon, Libya, Morocco, Syria, and Tunisia have developed technologies that can improve crop/livestock systems to enhance and stabilize production and the quality of feed, and to reduce pressure on natural resources (both arable and rangelands). The recommended food plan would include:

- Improved barley varieties;
- Forage legumes *(Vicia Sativa)*;
- Vetch-barley crop rotation;
- Urea treatment of straw;
- Adoption of feed blocks;
- Planting of cactus *(Opuntia ficus indica)*;
- Reestablishment in the rangeland of native fodder shrubs (*Atriplex*).

Improved Barley Varieties

ICARDA has developed a wide range of genetically modified barley such as the improved - high yielding, salinity resistant - variety "*Rihane 03*". Despite 43% higher yields compared to common varieties, modified varieties are estimated to be grown on about only 50,000 hectares in Iraq, representing just about 3% of the 1.6 million hectares area sown annually in barley.[15]

Forage Legumes (Vicia Sativa)

Vetch *(Vicia Sativa)* has the ability to survive in harsh conditions or marginal land with low rainfall (250 mm per year) and to produce herbage and pods, which provide nutritious feed for livestock. The use of a legume such as Vetch, in rotation with cereals, helps to increase yields by reducing nitrogen depletion. Vetch uses little water and provides greater above-ground biomass in terms of available moisture, thus leaving more soil moisture to be exploited by the next year's cereals crop than would be the case otherwise. Last but not least, *Vicia Sativa* provides a nutritious and flexible feed and forage source for livestock.

Urea Treatment

[15] Rihane 03 avg. yield is reported between 2.8 and 3.4 tons/ha.

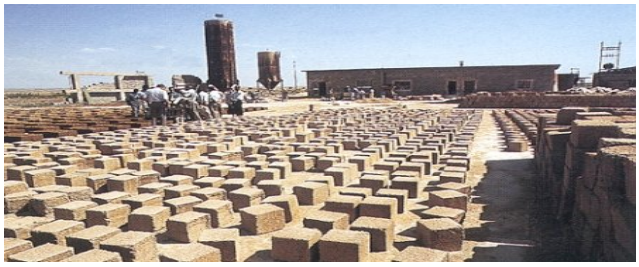
Urea is an important source of nitrogen for small ruminant animals. However, it can be poisonous if ingested in large quantities. ICARDA researchers have developed an innovative technique to create feed blocks of straw treated with urea, resulting in substantial average daily weight gains (ADG).

Feed Blocks

Feed blocks are a solidified mixture of agro-industrial byproducts such as tomato pulp, date pulp, rice bran, poultry parts, used for supplementing poor quality roughage and the products of native rangelands. They are considered as a catalytic supplement, allowing a differentiated, synchronized and balanced supply of the main nutrients (i.e. energy, nitrogen, minerals, and vitamins) for animals. The value of feed blocks lies in their role as cost-effective supplements and as a means for utilizing several high moisture agro-industrial byproducts (*e.g.* tomato pulp, olive cake, etc.). Feed blocks can reduce the use of conventional concentrated feeds (based on grains) by more than 50%, thereby reducing considerably the cost of feeding sheep.[16] Although feed blocks are not new, the Mashreq/Maghreb (M&M) project revived interest in feed block technology as an option for sheep owners in vast semi-arid areas.

Livestock owners have readily accepted feed blocks and the technology has spread rapidly through the countries involved in the M&M project. It has been an immediate success in the region, and Iraq was the first country to operate a plant, which had capacity of 4 tons/day when it opened in 1998.

Iraq: Feed Block Factory



In Iraq, the private sector took the lead in producing agro-industrial byproducts and feed block on a large scale back in the '90's. Currently there are no operating feed block factories in Iraq.

In the opinion of many experts, feed blocks could provide a sustainable solution to the endemic shortage of feed resources in Iraq: Feed blocks add value to raw materials that otherwise have little use, are easy to produce, and require little investment and know-how, in addition to the fact they have already been successfully tested in the market. The potential for feed blocks is huge: taking into account current shortages there could easily be demand for a some of 4,000 tons/day.[17]

[16] In Tunisia, for instance the actual cost of feed block is $65/ton compared to $165 for a ton of grain.
[17] Normal sheep feed intake – depending on nutritional value – ranges between 1.5-2.0 kg of DM. Feed blocks could realistically cover ¼ of daily intake needs.

Cactus *(Opuntia Ficus Indica)*

Cactus is extensively used in semi-arid countries as an emergency livestock feed during times of extreme drought. Cactus can survive with rainfall as low as 50 mm per year, and the *opuntia* species used for animal feed is easy and cheap to grow. Cactus is also used as a water source in drought conditions, since animals being fed with the pads of specially bred spineless cactus, have reduced water intake and may even stop consuming water entirely.

Tunisia: Extensive Crops of the Cactus *(Opuntia Ficus Indica)*

Shrub Fodder *(Atriplex)*

The high heat and salinity tolerance of certain of shrubs is important for rangeland rehabilitation, and provide alternative fodder at hard times of the year. Among available forage shrubs, some species of the genus *Atriplex* (particularly *A. halimus* and *A. nummularia*) have given good results for their resistance to heat, lack of water and salinity. Most species of *Atriplex* can survive arid conditions because of their deep root system, which enables them to reach water tables as deep as 10 m. *Atriplex* offers a good risk mitigation strategy for farmers, since it can be used as a forage reserve during summer and autumn, preventing the critical lack of forage resources in the period before the spring growth of herbaceous species.

3.3 Fertility Rates and Diseases

It was clear from the ICARDA sheep fertility survey that the *Awassi* sheep in Iraq have a significant fertility problem. The low lambing percentages were attributed to correctable, low ovulation rates that correlated in part to poor nutrition.

All the shortcomings leading to the current low fertility rate of *Awassi* sheep in Iraq have been identified and addressed:

- Nutritional improvement is required; with appropriate nutrition, the lambing rate was raised from 45% to 77% at the ICARDA experimental station.

- Hormone treatment of 52 flocks in the project raised lambing and twinning rates by 39% and 40% respectively in semi-intensive systems, and by 25% and 40% among extensive flocks.[18]

- Poor adherence by the farmers to early weaning and twice-yearly lambing techniques.[19]

- The animal disease situation in Iraq was the consequence of the collapse of the veterinary infrastructure all over the country, and the lack of vaccines in the market, lack of interest in reporting disease and the absence of trained auxiliaries especially at local level. All these can be reversed.

The only area where the program failed to identify solutions was that of genetic improvement through genetically improved rams. Tested imported breeds have proved difficult to adapt in Iraq with the exception of the Israeli "*Assaf*", a cross between the *Awassi* and the German *Friesan*. The *Assaf* has about three lambings every two years, with a recorded 320 liters/year production of milk.

[18] An Iraq team was able to extract and produce the hormone locally.
[19] Early weaning may be an important factor in accelerated lambing flocks, to allow ewes to return to breeding condition more quickly.

4. SMALL RUMINANTS IN IRAQ: THE UNADDRESSED CONSTRAINTS

Three constraints that affect the development of a sheep industry remain currently unaddressed:

- Land rights and tenure;
- Credit availability – especially for small farmers;
- Little awareness of new technologies and techniques, due to lack of extension services for farmers.

4.1 Land and Rangeland Rights, Tenure and Management

The rangelands of Iraq are a resource that requires collective action in their management. The wide areas they cover and the poverty of the people living there have always pushed successive Iraqi governments to consider rangeland development as a responsibility of the central government. Pastoral communities were perceived as lacking the financial, technical and institutional capacity to control and manage rangelands.

A generation ago, the native pasture vegetation in the rangelands provided a large proportion of the necessary feed for small ruminant animals. Today, however, the natural rangeland can no longer provide the same percentage of animal feed because of prolonged overgrazing. Hence, there is a need for a policy and legal framework to support collective action and foster community and individual stewardship of the rangelands. Currently the absence of secure property rights and tenure means that producers have no incentive to invest in rangeland management or productivity improvements.[20]

4.2 Credit Availability

Many of the small animal producers in Iraq who live in marginal dry areas have little or no land, which makes them ineligible for credit from formal sources. Informal credit from traders and wholesalers is often the only source of capital, with very high interest rates, sometimes as high as 40% annually. New financial institutions such as community-based micro-credit organizations that improve access to capital must be developed in order to avoid the transfer of a considerable portion of the added value chain to traders and wholesalers to the detriment of the farmers.

4.3 Know-how and Extension Service

Poor interaction between researchers, farmers, extension workers and policy makers is a major obstacle to improved sheep productivity in Iraq. In most parts of the world extension workers have the responsibility of assisting farmers in adopting new technologies, identifying specific or regional agricultural problems, and communicating recommendations as to management practices. In today's Iraq, most of the research results simply do not get to farmers for lack of an extension service. An additional problem, again related to credit, is that farmers do not

[20] Especially in areas where land is either collectively owned or owned by the state.

accept innovations which require additional activities beyond household labor capacity or beyond their financial resources.

The Iraqi National Agricultural Research System (NARS) currently has about 2,100 scientific and technical staff. That number is insufficient to address the highly diverse and complex agricultural problems arising from more than twenty years of insufficient funding and changing priorities. The government investment in extension services is currently very weak. Budget allocations for the extension service dropped from 10% of the total agricultural budget in 1975 to less than 2% in 1990, when the number of extension workers was reduced to only 200 (one for every 10,000 farmers).

Funding for agricultural research is mainly provided through government allocations. International linkages are very limited. However, a number of regional (ACSAD) and international research centers (ICARDA) and organizations (FAO) have been involved in agricultural research and development in Iraq, especially during the last decade.[21]

[21] Arab Center for the Studies of Arid Lands and Dry Areas.

5. SMALL RUMINANT ANIMALS IN IRAQ: A NEW APPROACH

5.1 Status and Limitations of the Current Traditional Approach

Adopting improved animal health and nutrition practices, genetic enhancement and better animal handling are essential for improving the productivity of small ruminants but are - *per se* - insufficient to generate the leap in supply the sector requires in order to satisfy growing domestic and export demand. Under the current circumstances, the shortage of quality feed resources represents a serious constraint.[22] Based on a daily minimum intake of 2kg/sheep and assuming a fattening cycle of 150 days, the addition of 1 million sheep to existing Iraqi flocks would require a minimum of 300,000 tons of feed - forage and barley. At the current yields, that would require an additional 300,000 ha be planted.

In the rangelands, widely deteriorated due to overgrazing, a dramatic increase in productivity is difficult to envisage, even were the recommendations of the M&M program to be implemented. The measures proposed there for the rangelands seem more likely to stop the present deterioration rather than to increase dramatically the production of feed resources.

In the central regions of Iraq, and in any area where supplemented feed constitutes the main daily intake for sheep, a target of an additional 1 million sheep could only be achieved by a massive conversion of land for this purpose, contradicting the current government strategy of supporting wheat production for bread. A new more, innovative approach is clearly required to meet the challenge of expanding the supply of small feed resources. Three areas of intervention look particularly promising and viable despite the significant constraints in Iraq at present:

- The creation of semi-intensive sheep clusters in areas with better food resources, refered to as “little New Zealand in Iraq”;
- The massive development of a feed block industry. It offers a food supply in principle more easily expandable than crops such as barley and forage, that require additional quality land and water.
- Adoption of local participatory approach in the rangelands in order to sustain land management and productivity, along with community-based micro-credit schemes.

5.2 Sheep Cluster Creation

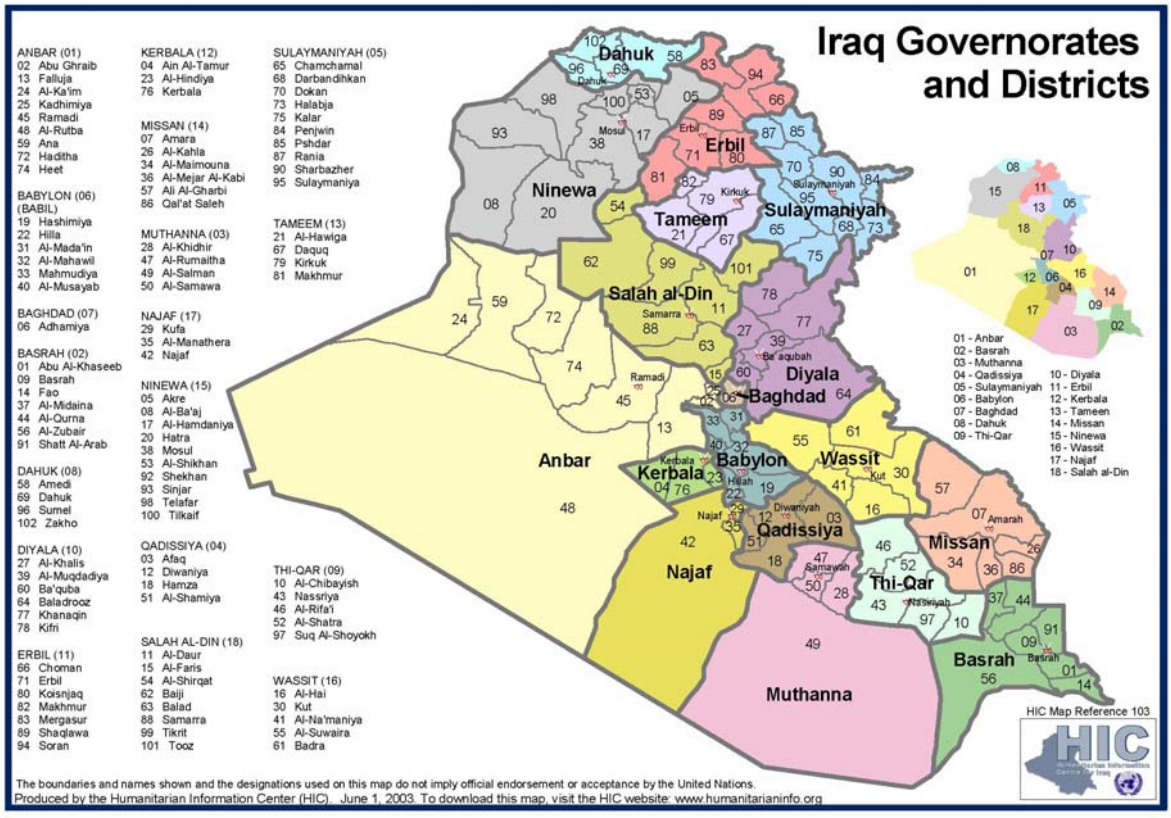
Sheep and goat raising are traditionally marginal activities. They usually thrive in semi-arid areas with little and erratic rainfall and poor vegetation, not suitable for agriculture. Small ruminants use marginal lands and crop residues - otherwise of little or no value. In most of the Middle East, quality land is allocated for horticulture, even if – as is the case of Iraq – sheep breeding could well offer better financial returns. Equally important, governmental programs usually prioritize horticulture rather than small ruminants. Sheep raising is often considered an important source of supplemental income but rarely a strategic industry. However another approach is also feasible: The grazing of sheep in richer areas with greater resources, higher rainfall and more natural, good quality pasture. In such areas, most of the required daily feed

[22] A suitable target in order to make the sheep industry a relevant exporter and to match domestic demand would probably be a minimum of an additional 4 million sheep.

intake would be supplied by natural forage – as is the case in Australia and New Zealand – with limited supplemental feed.

Areas with such favorable characteristics exist in Iraq, especially in the governorates of Tameem, Erbil, Sulaymaniyah, and possibly Salah al Din.[23] A small "New Zealand in the Middle East" would be the result of establishing a sheep cluster in Iraq.

Iraq: Governorates



The cluster approach seems appropriate for the development of the sheep sector since:

- Grazing management requires a community approach;
- Extension services specific to a cluster are easier to implement than a generic national service;
- Credit services would be easier to implement; repayment rates and financing costs would be lower ;
- Developing a feed block industry would be easier if there is a concentrated cluster.

[23] According to the ICARDA report, 2002 M&M.

5.3 The Development of a Feed Block Industry

Developing a feed block industry is strategically sound and is the best short term response to the current animal feed shortages. It is vital to increasing feed supply. The feed block is also efficient, labor intensive, and creates jobs. It adds value to otherwise poor raw materials and requires minimal capital investment. The feed block industry could also be integrated in a sheep fattening system with micro-finance services financing the block during the growth cycle.

5.4 Local, Community-Based, Participatory Approach

In order to sustain and improve rangeland productivity, proper management using a participatory community approach is needed. Government institutions must participate as partners in the process in order to empower the herders. The community approach should include education on grazing management, and analyze the existing, relevant biological and socio-economic community data. A community grazing management plan should be developed, implemented, and monitored in a participatory manner. This approach was used successfully by ICARDA in the Oudja community in Morocco. The model used there has now been scaled out to rangeland management activities implemented by ICARDA and national programs in Algeria, Libya, Mauritania, and Tunisia within the framework of a project financed by the Swiss Agency for Development Cooperation (SDC).

6. CONCLUSIONS

In many ways the production of small ruminant animals - especially sheep - is a neglected sector in Iraq, attracting little interest or investment from the government. Usually it is only marginal to agricultural programs. Sheep raising nevertheless could become a strategic, important sector, contributing to Iraqi exports - especially to the GCC, thereby adding value and creating jobs in rural areas. It also could become an engine for developing related industries such as feed blocks - solidified mixtures of agro-industrial byproducts such as tomato pulp, date pulp, rice bran, and poultry parts.

The demand factors are all extremely favorable: Consumption of lamb and mutton – now at 3kg per capita – should recover medium-term to pre-embargo levels (8.5kg/capita). The entire Middle East - and in particular the GCC - import a considerable amount of sheep, conservatively estimated at 10 million head/year.

The constraints currently afflicting the development of Iraq's sheep supply have already been identified and analyzed.[24] The shortage of quality feed has been clearly identified as the main problem, followed by low fertility rates, lack of veterinary services, a lack of credit facilities and the absence of an operational extension service capable of bridging the gap between researchers and farmers.

If the recommended steps are taken, the sheep sector could experience significant gains in productivity, though probably not sufficient to expand supply at the same pace as demand. The objective of dramatically increasing supply requires a new approach.

A strategy could be based on:

1. Creating a semi-intensive sheep-grazing cluster in richer, more resourceful areas with higher rainfall and more natural, good quality pasture available. In such areas most of the required daily feed intake would be supplied by natural forage, as in the case of Australia and New Zealand – with limited supplemental feed. That supports the creation of clusters a "little New Zealand in Iraq". Appropriate areas exist in Iraq, especially in the governorates of Tameem and Erbil, which together account only for less than 10% of the Iraqi sheep production at the present.

2. The development of a large feed block industry, a food supply more easily expandable than crops such as barley and forage that require additional quality land and water.

3. Adopting a local participatory approach in order to sustain land management and productivity along with community-based micro-credit schemes for rangelands.

A cluster approach seems the most appropriate solution for overcoming the current constraints in the sheep sector, promoting community based land management, and facilitating the linkage with credit and extension services. On the other end developing a feed block industry is vital not only to provide an additional source of animal feed - but also to create jobs in rural areas while requiring little investment and using available technology and know-how.

[24] Icarda M&M program.

The possible link between a sheep fattening system and micro-finance also looks promising: Micro-finance institutions could provide working capital for the fattening cycle (on average 5 months) and finance the purchase of feed blocks through a collateral scheme at the cluster level.

Credit and micro-finance are vital for implementing of the feed plan for the rangelands highlighted in the M&M study, since farmers seem reluctant to accept innovations requiring additional self financing. Because of a lack of resources, a local community-based approach seems more appropriate than a national plan. Furthermore, the solutions identified by ICARDA should be pursued not only as way to increase productivity, but also as a measure promoting rangeland management and conservation, with clear positive effects on the environment.

Unfortunately, the prospects for a leather industry depend heavily on structural changes in the supply chain: Under the current system of animal live transport and slaughter in small and medium-sized butcheries, the leather industry has no chance of achieving the economies of scale and level of competitiveness required to compete with Turkey, Pakistan and India.

INVESTOR FOCUS

Sheep raising in Iraq is a very traditional business with strong links to local communities and tribes and little presence of foreign capital or “outsiders”. The creation of specific, semi-intensive clusters “a little New Zealand in the Middle East” is potentially attractive to investors from the Gulf countries, who are very active in agribusiness ventures all over the region. After a feasibility study, and with the appropriate market positioning, the opportunity could attract potential investor interest in the Gulf States, where it should therefore be presented.