2.5 RECONSTRUCTING THE ANIMAL HEALTH INFRASTRUCTURE AND LIVESTOCK PRODUCTION

Private veterinary center at a northern animal auction.

RECONSTRUCTING THE ANIMAL HEALTH INFRASTRUCTURE AND LIVESTOCK PRODUCTION

Sheep awaiting Brucellosis vaccination in southern Iraq.

Livestock production is an important economic activity in Iraq, contributing about 50% of agricultural GDP annually. Livestock production takes place throughout the country, and popular animals for breeding include sheep, goats, buffalo, cattle, and chickens. Some of this production is large-scale, representing the main source of an income for a breeder. There is also a great deal of small-scale, "backyard" livestock production in Iraq, wherein families keep small numbers of livestock and poultry for household consumption and supplemental income from their sale.

ARDI focused its efforts on improving the infrastructure that supports livestock production, including improving animal health services and increased production of forage crops and improving rangelands. ARDI also implemented projects to improve production of sheep and buffalo, animals that represent a large proportion of livestock breeding activity in Iraq.

TABLE 60 SUMMARY OF ANIMAL HEALTH PROJECTS

Program Target	Number of Projects	Projects Primary Beneficiaries
Improving Infrastructure for Animal Health	3	1 project to rehabilitate veterinary clinics (68 clinics) 1 project to establish private sector veterinary clinics (40 clinics) 1 project to raise awareness of zoonotic diseases
Improving Sheep Production	6	1 project to improve nutrition in pregnant ewes 1 project to improve nutrition in lambed ewes 1 project to improve nutrition in suckling lambs 1 project to improve nutrition in pre-mating lambs 1 project to provide brucellosis vaccination 1 project to provide access to sheep dip tanks
Improving Forage Crop Production and Rangelands	3	1 project to improve barley/vetch production 1 project to improve forage crop production 1 project to assess rangelands and recommend improvements
Improving Buffalo production	2	1 project to improve reproduction in the hot season through hormone treatment 1 project to improve reproduction through improved nutrition

IMPROVING INFRASTRUCTURE FOR ANIMAL HEALTH

Vet Clinic - Before and After

VETERINARY CLINIC REHABILITATION

Veterinary services are essential to maintaining the health of livestock and reducing production losses caused by diseases or general poor health. The Ministry of Agriculture maintains a network in excess of 200 veterinary clinics throughout Iraq that provide essential services to livestock breeders to maintain the health of their animals. For many breeders who cannot afford the costs of private clinics, these clinics are the only source of basic services to maintain animal health and prevent or reduce production losses. The clinics also implement vaccination campaigns against major diseases (foot and mouth disease, enterotoxemia, brucellosis, and newcastle), and coordinate preventive vaccination campaigns and treatment during disease outbreaks.

During the previous regime, many of these veterinary clinics were not maintained. Although there is a large cadre of well-educated veterinarians in Iraq, the staff of these clinics were often poorly paid and undertrained. As a result,

many clinics are inoperable or ineffectual in providing services to livestock breeders. Many veterinarians employed at the clinics are not able to go to work, due to the poor condition of the clinic facilities.

ACTIVITIES

In 2003, as part of its reconstruction strategy, the Ministry of Agriculture in Baghdad developed a comprehensive strategy for rehabilitation to return the clinics to a functional condition. ARDI agreed to fund a number of these, while construction of new clinics and other rehabilitation was to be funded through the MOA budget, as well as through the Food and Agriculture Organization, the United States military, some NGOs, and other donors. The MOA preferred that ARDI renovate clinics in disputed areas on the border with the northern Kurdish region, including the governorates of Ninewa, Diyala, and Tameem.

The clinics in the governorates of Erbil and Dahuk were under the jurisdiction of the MOAI/Erbil, and the MOAI/Sulaymaniyah controlled those in that governorate. The clinics are now under the jurisdiction of the Ministry of Agriculture of the Kurdish Regional Government. The MOAs in the northern region did not create a specific rehabilitation plan nor commit funding to clinic repairs as did the MOA/Baghdad. ARDI worked with the General Director of Veterinary Services from each MOA to assess the requirements. From 2003 – 2006, ARDI was the only funding source to rehabilitate veterinary clinics in the northern region, and the major program to improve veterinary services to farmers in the KRG.

In all locations ARDI worked through local subcontractors, who were awarded the jobs based on competitive bidding. The rehabilitation grants provided each clinic with the necessary repairs to walls, roof, floors, doors, and windows, and repaired or replaced the electrical and plumbing systems and necessary hardware.

ARDI rehabilitated a total of 68 clinics in 17 governorates, serving 135,068

TABLE 61 VETERINARY CLINIC REHABILITATION PROJECTS BY GOVERNORATE

Governorate	Number of Clinics	Livestock Breeders Served	Animals Served	Veterinarians Employed	Temporary Workers Employed
Anbar	6	3,200	372,000	46	285
Babylon	2	4,100	160,000	29	90
Baghdad	6	42,050	677,500	69	275
Basrah	2	1,250	121,000	14	95
Dohuk	5	5,300	205,000	46	375
Diyala	2	2,250	138,000	27	115
Erbil	11	18,648	667,060	312	935
Kerbala	1	500	80,000	10	35
Muthanna	1	780	110,200	8	75
Najaf	2	11,970	347,000	27	105
Ninewa	5	8,800	372,000	45	305
Qadissiya	3	4,100	194,900	51	210
Salah al-Din	3	2,840	137,000	30	170
Sulaymaniyah	4	5,860	594,000	54	300
Tameem	10	14,670	568,000	97	490
Thi-Qar	2	5,550	740,000	54	110
Wassit	3	3,200	220,000	48	125
Total	**68**	**135,068**	**5,703,660**	**967**	**4,095**

A veterinarian in his PSP clinic in Dahuk

livestock breeders owning 5,703,600 animals. Thanks to these efforts, a total of 967 veterinarians were able to return to work in fully functioning clinics. Besides reducing production losses and increasing the income of the owners, the improved veterinary services will help prevent zoonotic diseases that may spread to humans, thus benefiting every member of the community in the target area. The veterinary clinic rehabilitation projects also provided temporary employment for a total of 4,905 workers who carried out the repairs (see Table 61 on prior page).

VETERINARY PSPS

While MOA clinics provide important animal health services to many Iraqi livestock holders, there are also large numbers of private clinics in Iraq that provide veterinary services on a fee-for-service basis. These clinics often operate in areas where the MOA clinics do not, and sometimes provide more expanded services for livestock breeders.

ACTIVITIES

In addition to rehabilitating MOA clinics, ARDI has worked with veterinarians to help them set up their own private sector clinics. There are many well-educated but unemployed veterinarians in Iraq who have the skills to do this. To help set up Private Service Provider (PSP) clinics, ARDI worked with the Veterinary Syndicates of Tameem, Dahuk, Ninewa, and Salah al-Din to select appropriate veterinarians, and trained them in business management skills (see Section 3.6 for more information on ARDI Business Management training workshops). ARDI also granted the veterinarians equipment to make the clinics operational.

RESULTS

In each governorate, 10 PSP clinics were opened, each employing two to three veterinarians. A total of 40 clinics owned by veterinarians have been set up, employing a total of 130 veterinarians. These clinics are expected to serve over 900 livestock holder clients.

VET-IN-A-BOX GRANTS

ARDI discovered during the process of rehabilitating veterinary clinics that often they would be slow to become operational due to a lack of instruments and supplies. To address this problem, ARDI designed a complementary program to provide clinics with equipment to enable them to become operational soon after repairs were completed. The Vet-in-a-Box is a clinic startup kit containing 48 basic instruments and supplies often hard to find in Iraq. Forty of the rehabilitated veterinary clinics received the Vet-in-a-Box package.

ANIMAL HEALTH AND ZOONOTIC DISEASE AWARENESS PROGRAMS

Small-scale ("backyard") breeding is a popular economic activity in Iraq. Families raise animals at their homes, which provides an essential source of food and income. However, traditional methods of breeding animals in or near the home often result in the spread of zoonotic diseases, which are diseases such as brucellosis, mange, echinococcus, tuberculosis, and avian influenza that can be transmitted from animals to humans. These diseases are spread to humans through contact with infected animals and consumption of products such as meat and milk from infected animals. The spread of zoonotic diseases is a threat to human health, and also increases livestock mortality, lowers production, and reduces breeders' income and source of food.

TABLE 62 PSP PROVIDERS BY GOVERNORATE

Governorate	Number PSP Clinics Established	Number Veterinarians Employed	Number Breeders Served
Dohuk	10	20	140
Ninewa	10	30	210
Salah al-Din	10	20	140
Tameem	10	20	140
Total	**40**	**90**	**630**

In order to raise awareness of zoonotic diseases among populations that rely on backyard livestock breeding, and teach prevention and treatment techniques, ARDI implemented a program of zoonotic disease awareness workshops in villages of four governorates. ARDI hired teams of agronomists and animal production specialists to work in pairs through local NGOs to deliver the workshops. ARDI trained the teams in participatory extension methods, including the use of extension materials such as posters and brochures, to maximize the impact of the training workshops.

Women in Ninewa are trained in identifying ectoparasites (ticks) on a goat

Women attend a zoonotic disease awareness workshop in Dahuk

The training workshops were delivered in a total of 1,845 villages in four governorates (see Table 63). They targeted mostly women, who are particularly susceptible to contracting and spreading zoonotic diseases because they feed the animals, handle newborn animals, and process milk. Workshop topics included proper feeding and milking methods, sanitary food processing, common health risks when working with animals, and handling of newborns. The women learned the symptoms and treatment of common zoonotic diseases, as well as how to prevent these diseases in animals and humans.

The participatory nature of the training rendered it very effective. As one of the trainers reported, "The workshop attendees were very responsive to the training materials and contributed greatly to the discussions and the question and answer period." Following the training, 2-3 women were selected from each village to be "pioneers" for extension to the rest of the women in their village. Further extension was achieved by distributing posters and leaflets containing information on animal breeding and zoonotic diseases. Each village posted the information in public places such as schools and mosques.

Interviews conducted after the program yielded praise for many aspects of the training, as well as requests for further information and continued outreach. As one respondent noted, "The training sessions have been very effective since they were supported with simple, clear, and easy to understand illustrational materials such as posters and folders . . . every person in the villages could easily comprehend the idea of the distributed folders and posters."

After the appearance of avian influenza in Iraq, the workshops began offering information on how to recognize signs of infection in poultry, how to report suspected cases, and safe handling of poultry to prevent infection. The workshop participants were grateful for the information. Said one participant, "Before we were scared to even look at a chicken. Now we know how to handle them safely."

Classes were often held in impromptu venues.

Materials uses in zoonotic disease awareness training workshops

TABLE 63 ZOONOTIC DISEASE AWARENESS WORKSHOPS

Governorate	# villages visited	# Trainees		
		Women	Men	Total
Ninewa	405	6,260	1,667	7,927
Dohuk	240	2,695	1,733	4,428
Sulaymaniyah	720	7,948	7,535	15,483
Tameem	240	1,817	1,443	3,260
Diyala	240	2,520	1,667	4,187
Total	**1,845**	**21,240**	**14,045**	**35,285**

IMPROVING SHEEP PRODUCTION

Sheep marked for sale at a sheep market in Iraq

Sheep production is a very popular activity in Iraq. The type of sheep most commonly raised in Iraq is prized for its meat. Although exports are currently banned by the government, sheep breeders enjoy a good market for meat domestically, and also in the region via smuggling channels through Iran. Sheep holders gain income from the sale of both meat and wool.

It is estimated that there are currently 200,000 – 250,000 head of sheep in Iraq. The size of flocks varies from small (30-150 head) to large (more than 1,000 head). Production is lower than international standards, due to low reproductive efficiency caused by poor nutrition, and to disease, the most serious being brucellosis. Those who raise sheep for wool also suffer reduced income due to a lack of facilities to clean wool, so that it sells at lower market.

ARDI has implemented several programs to improve production of Iraq's sheep population through:

- Increasing the reproductive efficiency through improved nutrition, including improved forage crop production and rangelands management;
- Implementing a brucellosis vaccination campaign; and
- Increasing access to sheep dip tanks to improve wool production.

Breeders collect barley feed for their sheep

INCREASING REPRODUCTIVE EFFICIENCY OF SHEEP THROUGH IMPROVED NUTRITION

Proper nutrition for ewes and lambs is important to the reproductive efficiency of a flock. Proper nutrition stimulates ovulation in premating ewes and increases the chances of conception. During pregnancy, nutrition is essential to the health of the lamb. Poor nutrition in pregnant ewes results in low lambing rates and higher lamb mortality rates. After lambing and during the nursing period, ewes require proper nutrition to maintain their own body condition, so that they will be ready to mate again the next season. It is also essential that lambs receive proper nutrition during this nursing period, either from well-fed mothers or in supplemental feed, to survive until weaning at higher rates.

In Iraq, many sheep holders depend heavily on stubble grazing and poor pastures as the sole source of feed for their sheep. Many farmers cannot afford, or do not have access to, better nutrition such as green roughage and concentrates, which are especially important during the limited rainfall seasons or dry years. As a result of recent droughts that have reduced food availability, many holders feed their ewes only on grazing stubble, without any supplemental feed such as barley, which provides excellent nutrition for sheep. The result has been an overall reduction in reproductive efficiency in Iraq's national sheep flock.

In order to reverse this trend, ARDI implemented a comprehensive program to improve nutrition in premating, pregnant, and lambed ewes, as well as suckling lambs. The program included the distribution of barley feed to sheep holders in south-central and southern Iraq to demonstrate the economic benefits of feeding sheep an improved diet. In addition to improving sheep reproduction in the target flocks, these projects encouraged area breeders to adopt regimes of improved nutrition for their own sheep, and stimulated local agribusiness to begin selling the concentrate diet.

In addition, ARDI implemented a program to increase production of nutritious forage for livestock. It demonstrated integrated barley-vetch production as part of the 2004 – 2005 Winter Crop Technology Demonstration project, and in 2006 demonstrated crop rotation for clover, Sudan grass, and Egyptian sorghum. We also conducted an assessment of rangelands in Iraq and sponsored a national workshop with government and other stakeholders to determine next steps for preserving and improving grazing lands in Iraq.

IMPROVING NUTRITION OF PREGNANT EWES

The ARDI sheep nutrition project began in August 2005 with an effort to improve nutrition for pregnant ewes in Wassit. Good nutrition is particularly important for pregnant ewes because healthy, well-fed ewes are more likely to give birth to heavy, healthy, and viable lambs more likely to survive to weaning.

ACTIVITIES

To demonstrate the importance of good nutrition for pregnant ewes, ARDI provided barley fodder to 28 sheep holders in Wassit governorate, who owned a total of 2,000 pregnant ewes. These breeders faced an especially dry year and the resulting lack of pasture put ewes at risk of an even higher rate of unsuccessful pregnancies than usual. With improved nutrition, the breeders saw an increase in lambing rates, as well as an increase in milk production from

Breeders at a field day to observe the results of the ARDI project Improving Nutrition in Pregnant Ewes.

lambed ewes, which contributed to improved health of the lambs and increased the percentage of lambs that survived to weaning.

ARDI provided barley feed to participating holders for their pregnant ewes, at a rate of 0.25 kg per head for the last three months of gestation. ARDI staff monitored the pregnant ewes throughout the project, and took measurements including the rate of successful pregnancies (lambing rate), the weight of the lambs at birth, and the milk production during the first week post-lambing. ARDI staff also visited area sheep holders to measure their flocks for comparison purposes (see Table 64).

RESULTS

The project was successful in increasing the lambing rate to 84%, higher than the average lambing rate of 65% recorded from area flocks that were fed average nutrition. The average weight of the lambs born to ewes that received the improved nutrition was 59% higher than area lambs (4.6 kg as compared to 2.9 kg). These heavier lambs were more likely to survive to weaning. In addition, milk production from the project ewes in the week after lambing was 67% higher than area ewes (0.25 kg as compared to 0.15 kg). Higher milk production means

TABLE 64 INCREASED PRODUCTION FROM IMPROVED NUTRITION IN PREGNANT EWES

Number Owners	Number Ewes	Lambing Rate (%)		Lamb Birth Weight (kg)		Ewe Milk Production (kg)	
		Program	Area	Program	Area	Program	Area
28	2,000	84	65	4.6	2.9	0.25	0.15
% Improvement		31%		59%		67%	

better nutrition for the lambs, contributing to higher weight gain and higher rates of survival to weaning.

The sheep holders who fed their pregnant ewes improved nutrition saw real economic benefits from the project. The increased birth rate of the lambs means that more lambs survive to weaning, resulting in a greater number of male lambs that the holder can sell for meat, and a greater number of female lambs who will survive to adulthood and reproduce, replenishing the flock more quickly.

After the lambing season was complete, ARDI staff held a field day with breeders, both those involved in the project and those from the area, to explain the results of the project and encourage other breeders to adopt the practice of feeding pregnant ewes improved nutrition to increase lambing rates. A total of 130 breeders attended. Those who had received improved feed for their ewes were extremely grateful for the project, and explained to the other breeders the economic benefits that they had gained from increased lambing rates, and from having heavier and healthier lambs. The other breeders were impressed with the results, and indicated interest in improving nutrition for their own flocks.

A lambed ewe nursing her lamb

IMPROVING NUTRITION IN LAMBED EWES

In December 2005, after the lambing season was complete, ARDI initiated a program to improve nutrition in lambed ewes (ewes that have given birth and are nursing). ARDI worked with 274 sheep breeders who owned 6,000 lambed ewes in Wassit, Qadissiya, and Muthanna governorates in the arid south-central region of Iraq, where many sheep holders feed their flocks on inadequate grazing stubble. High lamb mortality is one consequence of this poor nutrition. This year, 9% of lambs nursing on mothers fed with the average diet did not live to weaning. Those lambs that did survive to weaning had relatively low weight, which means a lower price for the owner at market.

The project illustrated the advantages of feeding lambed ewes with improved nutrition during the period of nursing (three consecutive months after birth). Improving the nutritional level of lambed ewes through better feeding regimes is a logical initial step to improving the overall health of sheep in Iraq, and increasing flock sizes and breeders' income. Improving nutritional levels of

lambed ewes helps the ewes maintain their body weight and increase milk production. Consequently, lambs are healthier and survive to weaning at higher rates and with a higher body weight. This results in higher income for the breeder from the sale of male lambs for meat, and higher replacement rates of the flock from healthy, weaned female lambs.

ACTIVITIES

ARDI staff distributed barley concentrate diet to the breeders to feed their lambed ewes at a rate of 0.50 kg per head per day during the three-month nursing period after birth. ARDI staff visited the flocks to measure milk production, lamb mortality rates, and the weight of lambs at time of sale to market (three months after birth). For purposes of comparison, ARDI also took these measurements from lambed ewes and their lambs in the same areas, which were fed a diet normal for the area (see Table 65).

TABLE 65 INCREASED PRODUCTION FROM IMPROVED NUTRITION IN LAMBED EWES

Governorate	Number Owners	Number Ewes	Lamb Market Weight (kg)		Mortality rate (%)		Increase in milk production (%, v. area)
			Program	Area	Program	Area	
Wassit	93	2,000	21	18	2.5	9	66
Qadissiya	81	2,160	20	16.5	4	7	46
Muthanna	100	1,900	20.5	19	5	9	29
Average			**20.5**	**17.8**	**3.8**	**8.3**	
Average Improvement			**18.80%**		**53%**		**47%**

RESULTS

The project succeeded in increasing lamb market weight by 18.8% compared to area lambs that were fed by ewes that did not receive improved nutrition. Since lambs are sold by weight, this increase in market weight represents a significant increase in income for breeders. The project was also successful in reducing the mortality rate of lambs by 53%, thus increasing the number of lambs who survived to weaning to be sold for meat (male lambs), or to replenish the flock and increase flock sizes (females). This also represents a real increase in income for breeders.

Sheep holders saw an immediate economic benefit this season from the sale of their male lambs for meat. For those male lambs which nursed on ewes that received improved nutrition, the average weight at time of sale was 20.5 kg, while the average weight of other weaned male lambs in the area was 17.8 kg. At an average price of $3.6/kg, breeders who fed their lambed ewes improved nutrition will receive a price of approximately $75 per lamb, while other breeders will get only $64.

Breeders who fed improved nutrition also had more lambs to sell, due to reduced mortality rates. Out of 100 lambs, these breeders saw 96 survive to weaning (3.8% average mortality), and approximately half were male, suitable for

sale after weaning. This represents an income from the sale of meat of $3,600 per 100 lambs born (98 survive to weaning, 48 are male). However, those breeders who did not feed an improved diet this year saw only 91 survive past weaning (8.3% mortality rate), for a total income from sale of meat of $2,880 per 100 lambs born (91 survive to weaning, 45 are male).

In addition, breeders who fed improved nutrition to lambed ewes saw an increase in the number of female lambs that survive to weaning. This will result in a faster increase in their flock sizes, which means greater milk and wool production, as well as higher rates of reproduction when these female lambs reach puberty.

In June 2006, ARDI held a field day for area and participating sheep holders to demonstrate the results of the program, and to encourage breeders to adopt the practice of feeding improved nutrition to lambed ewes, to increase lamb market weights and reduce mortality rates. A total of 150 breeders attended the field day.

A lamb that received supplemental feed is weighed at weaning.

IMPROVING NUTRITION IN SUCKLING LAMBS

While improving nutrition in lambed ewes can be an extremely effective way to increase the weight and weaning rates of lambs, it is also important to supplement the diet of the lambs themselves to improve their health. This is especially important in areas where lambs have limited opportunity to suckle. In many parts of Iraq, during the dry season, sheep holders will graze their ewes in pastures far from the farm and away from their lambs, which remain on the farm. These lambs are able to suckle only twice per day, and as a result they have lower body weights and higher mortality rates. Improving nutrition in these lambs through supplemental feeding increases weaning rates and helps lambs gain weight more quickly, which brings a higher price for them at market.

ACTIVITIES

To demonstrate improvements in lamb health and weight when fed an adequate supplemental diet, ARDI worked with 116 sheep holders in Wassit governorate and 125 holders in Najaf governorate. These holders owned a total of 2,000 lambs whose mothers graze far from the farm, which would normally result in inadequate suckling. ARDI provided a supplemental diet of barley feed, which the holders fed to the lambs at a rate of 0.50 kg/head for three months after birth, until weaning. ARDI staff monitored the flocks and took measurements, including a monthly weighing of the lambs and an estimation of mortality rates. ARDI staff also visited area flocks in order to collect the same data about lambs which did not receive a supplemental diet, for comparison purposes.

RESULTS

The project was successful in decreasing mortality by 65%, from an average of 6.5% in area lambs that did not receive supplemental diet, to an average of only 2.25% for project lambs. The weight of the lambs that did survive to weaning was 27% higher in lambs that received supplemental feed, as compared to those which did not (see Table 66). Male lambs are sold to market at weaning, and the higher weight represents an increase in income for breeders. Female lambs that are heavier at weaning are likely to be healthier and survive to reproductive age at higher rates, and will enable the holder to replenish the flock more quickly.

In April 2006, ARDI held a field day to demonstrate the positive results of this project to area breeders, both those who participated in the project and those who did not. Approximately 40 breeders attended the field day. All were impressed with the increase in lamb weight at weaning and reduced mortality, and they expressed interest in adopting improved feeding regimes to improve their own flocks.

TABLE 66 INCREASED PRODUCTION FROM IMPROVED NUTRITION FOR SUCKLING LAMBS

Governorate	Number Owners	Number Ewes	Lamb Market Weight (kg)		Mortality rate (%)	
			Program	Area	Program	Area
Wassit	116	2,000	29	24	**2.5**	**6.5**
Najaf	125	2,000	25.5	19	2	6.5
Total	**241**	**4,000**				
Average Improvement			**27%**		**65%**	

IMPROVING NUTRITION IN PREMATING EWES

For the most efficient reproduction in a flock, it is important to ensure that ewes receive proper nutrition even before mating begins. Ewes must enter estrus (ovulate) in order to mate, but many ewes in Iraq that feed on grazing stubble without any supplementary diet suffer from poor body condition and therefore do not ovulate in some seasons, which leads to lower mating and pregnancy rates, and impedes replenishment of a flock. A ewe that does not lamb costs the holder in terms of lost income from meat and wool.

Prior to the 2006 lambing season, ARDI introduced a program to improve nutrition in premating lambs in Kerbala, Wassit, and Muthanna governorates. The improved diet helps to increase the rates of ovulation and mating, and also

improves the body condition of the ewes to ensure successful pregnancies and greater birth weights of the lambs.

ARDI distributed concentrate diet to 274 breeders in Wassit, Babylon, and Kerbala governorates who own 6,060 ewes that were premating in May 2006. Each ewe was fed 0.50kg per day of barley grains, for three months premating.

The results of this project, including ovulation and lambing rates, will not be known until after the publication of this report.

TABLE 67 IMPROVING NUTRITION IN PREMATING EWES, 2006

Governorate	Number Owners	Number Ewes
Wassit	93	2,000
Babylon	81	2,160
Kerbala	100	1,900
Total	**274**	**6,060**

BRUCELLOSIS VACCINATION CAMPAIGN

Brucellosis is a significant disease in sheep in Iraq, and is prevalent in many regions of the central and southern parts of the country. Brucellosis causes heavy economic losses for sheep holders from decreased production due to abortions, sterility, decreased milk production, and the cost of replacing diseased animals in the flock. Brucellosis is a zoonotic disease, meaning that it can be spread from animals to humans, and therefore poses a threat to human health as well.

The incidence of brucellosis can be greatly reduced through vaccination. In order for brucellosis vaccination to be effective, it must cover all animals in a given area. In order to reduce the incidence of brucellosis in southern Iraq, ARDI implemented a vaccination campaign in 2005 covering the southern governorates of Muthanna, Qadissiya, Thi-Qar, Missan, and Basrah.

ACTIVITIES

In the summer of 2005, ARDI began planning for the vaccination campaign for nearly 572,000 sheep. The best time to vaccinate sheep against brucellosis is before the onset of puberty, since the vaccine itself can cause abortions in pregnant ewes. ARDI procured the brucellosis vaccine from a manufacturer in Spain, and worked with the Directorate of Veterinary Services in each governorate to obtain lists of unemployed veterinarians to implement the campaign. A total of 291 veterinarians were employed to carry out the campaign, working in 97 mobile teams of three veterinarians each. Before the beginning of the campaign, ARDI provided the teams with a refresher training on methods of vaccination, vigilance of the cold chain, the method of filling out registration forms, and security awareness. During the campaign, the mobile teams were responsible for the vaccinating the animals, keeping field-based record, maintaining equipment, and securing cold chain during travel.

The vaccination procedures were implemented according to the standards of the The State Company for Veterinary Services of the Ministry of Agriculture.

A veterinarian vaccinates a sheep in Basrah

The team leaders were responsible for announcing vaccination locations daily to local sheep holders. Registration forms were filled and filed for each sheep holder, regarding the number of animals owned and which animals were vaccinated. This paperwork will be used as both a record and a reference for other vaccination campaigns. It also enables the MOA to collect the latest statistical information on sheep holdings in Iraq. Vaccinated animals were marked with a tattoo on the ear to indicate successful vaccination.

RESULTS

The vaccination campaign was carried out between December 3, 2005 and February 17, 2006. The great majority of animals were vaccinated by the end of January, with the final few animals in outlying regions vaccinated last. In several areas, work was interrupted by extended religious holidays as well as periods of violence in some areas, which prevented teams from traveling safely. Table 68 shows the period of vaccination for each governorate, and the total number of animals vaccinated.

TABLE 68 BRUCELLOSIS VACCINATION CAMPAIGN IN SOUTHERN GOVERNORATES, 2005

Governorate	Dates of Vaccination	Number of sheep vaccinated
Muthanna	Dec 24 to Feb. 17	253,388
Qadissiya	Dec. 18 to Mar. 3	110,709
Thi Qar	Dec. 3 to Mar. 3	74,552
Missan	Dec. 4 to Feb. 28	98,477
Basrah	Dec. 3 to Jan. 27	34,824
Total		**571,950**

Sheep dip tank in the North. ARDI also developed a treatment for the used effluent to neutralize the chemicals used in the dipping solution, making them more environmentally friendly.

SHEEP DIP TANKS

Most sheep holders make the majority of their income from the sale of meat, but the sale of wool can add to the value of a flock. In parts of Dahuk and Sulaymaniyah governorates, sheep holders generate the majority of their income from the sale of shorn wool. Unfortunately, in these areas the holders have concerns about the deteriorating quality of the wool. Wool quality is dependent on a number of factors, including grade (diameter), uniformity, strength, crimp, handle, color, character, purity, and contaminants.

A process called "sheep dipping" can improve these characteristics by keeping the sheep clean of scabs, blowfly, ticks, ked, and lice. Cleaning the sheep may increase wool value by over 50%. Dirty wool sells for about $1.30/kg, and clean wool sells for about $2.00/kg.

ACTIVITIES

In order to improve the quality of wool in wool-producing areas, as well as to improve the overall health of the sheep, ARDI worked with MOA veterinary clinics in Dahuk and Sulaymaniyah to install sheep dipping tanks. The dip tank is a concrete basin that is filled with chemicals, into which sheep are dipped to kill pests and improve the condition of their wool. ARDI worked the MOA veterinary clinics in each target area to select sites, and then selected a local subcontractor through a competitive bidding process to construct the basins.

The veterinary clinic staff manage the tanks and oversee the sheep dipping process. They provide the chemicals for dipping at a nominal charge, and supervise the process each season.

ARDI funded the construction of 10 tanks, six in Dahuk and four in Sulaymaniyah. The tanks have the capacity to treat a total of over 102,000 sheep owned by 750 holders in the target areas each season. The construction of the tanks benefited 95 temporary employees, who earned wages for their labor, providing an immediate injection of cash into the local economy.

TABLE 69 SHEEP DIP TANK CONSTRUCTION

Governorate	Number of Tanks	Villages Served	Breeders Served	Sheep treated	Temporary Jobs Created
Dahuk	6	21	258	71,700	20
Sulaymaniyah	4	13	492	30,900	75
Total	**10**	**34**	**750**	**102,600**	**95**

IMPROVING FORAGE CROP PRODUCTION AND RANGELANDS

Sheep migrating to the mountains in the North.

Grazing pasture is an important source of food for many sheep and other livestock in Iraq. Breeders who own land can make good use of it by rotational planting of green forage crops that provide nutrition for their animals in most months of the year. These crops include barley, vetch, clover, Egyptian sorghum, and Sudan grass.

ACTIVITIES

In 2004, ARDI and the MOA implemented an integrated barley-vetch forage production project as part of the 2004 – 2005 Winter Crop Technology Demonstration program. Barley and vetch are both important food sources for sheep. Vetch seed is an especially good source of protein in the sheep diet.

Locations were chosen in areas of moderate rainfall in Ninewa. At two sites, vetch was planted alone for seed production (one 10 ha plot and one 1 ha plot).

Sheep graze on demonstration fields planted with barley and clover mixture in Wassit

In five other sites, a vetch-barley mixture (75% vetch, 25% barley) was planted.

The following improved technologies were used to cultivate the fields:

- Triple super phosphate fertilizer added at 50 kg/ha during seed bed preparation;
- Date of sowing was early January; and
- Seeding rates of 100 kg/ha for the two vetch seed production plots, and of 120 kg/ha for the mixture of barley (100 kg/ha for vetch and 20kg/ha for barley).

RESULTS

At harvest, the dry forage yield was estimated at 50% flowering by frame (1 m2) repeated ten times for each plot. The two vetch fields were harvested by combine or mower, and the crop was dried. The farmers used the vetch-barley mixture field for grazing or haymaking. Results of this project are noted in Tables 70 and 71.

TABLE 70 VETCH PRODUCTION, NINEWA, 2005

Location	Area (ha)	Dry forage yield (mt/ha)	Seed Production (mt/ha)	Utilization
1	10	4	1.2	Sheep fodder
2		33.6	--	Sheep grazing

TABLE 71 VETCH-BARLEY MIXTURES, NINEWA, 2005

Location	Area (ha)	Dry forage yield (mt/ha)		Utilization
		Vetch	Barley	
1	1	2.9	0.8	Sheep grazing
2	1	2.4	0.61	Sheep grazing
3	1	2.4	0.78	Sheep grazing
4	1	2.7	0.82	Hay making
5	1	2.8	0.86	Sheep grazing

It must be noted that there was a shortage of rainfall in April 2005, which is a critical month for the crop to have moisture for a good yield. This lack of rain resulted in a lower yield for both forage and seed production.

The farmers were enthusiastic about the production of barley and vetch for sheep grazing and fodder. There is a general lack of agricultural equipment for hay making, such a rakes, mowers, balers, and special harvesters needed to harvest low crops such as vetch. This issue must be addressed before more wide-scale production of barley-vetch mixtures can be achieved in Iraq.

In 2005, ARDI focused on the introduction of rotational cropping for clover, barley, Sudan grass, and Egyptian sorghum in arid regions of central and southern Iraq, where poor nutrition reduces production of flocks, particularly during the dry season.

The demonstrations were implemented in Wassit, Najaf, and Babylon to

introduce this type of rotational cropping to livestock holders and farmers. ARDI staff selected eight villages in which to establish demonstration fields (four in Wassit, two each in Najaf and Babylon). ARDI staff planted the fields, and also provided appropriate crop management techniques including irrigation, fertilization, and weeding.

In November 2005, four demonstration fields of 10 ha total were planted in Wassit. The fields were planted in two plots. Two ha were planted with a clover and barley mixture of varieties, that produced three harvests of green roughage that was used for fodder and grazing purposes. These harvests occurred in January, February, and April. A one-half ha plot was also planted with barley that produced a single crop, for comparison purposes. The clover-barley mixture produced a total of 500 kg of clover seed, in addition to the barley crop.

A field day was held to which area sheep holders and farmers were invited to observe the use cropping of barley and clover to produce several cuts of nutritional forage for livestock, which provides livestock with feed over a longer period than single-harvest crops.

ARDI expanded the program in July 2006 to include two demonstration fields each in Najaf and Babylon. These fields were planted with Egyptian sorghum, a very nutritious feed for livestock. The results of this project will not be known until after the publication of this report.

IMPROVING RANGELANDS MANAGEMENT

Many livestock holders in Iraq depend heavily on rangeland grazing to feed their animals. However, poor management has led to significant degradation of Iraq's rangelands, causing doubts as to the long-term sustainability of livestock grazing in these areas under current management practices.

In order to improve rangeland management in Iraq, ARDI conducted an assessment of the current condition of the rangelands, and brought together stakeholders including government officials, livestock holders, and NGOs for a national workshop to discuss a strategy for preserving and managing Iraq's rangelands.

A girl grazes sheep on rangelands in northern Iraq

The assessment of rangelands in Iraq found that these areas are becoming overgrazed. This is largely due to the conversion of much of the rangeland to cropland and residential property in recent years, which has reduced the amount of native rangeland available for livestock grazing, and is severely straining the capacity of the remaining rangelands to support the livestock being grazed. This deterioration of rangelands is most severe in areas immediately adjacent to villages. Soil compaction and erosion, deforestation, and deterioration of watersheds is evident in these areas, and perennial grasses and forbs are disappearing and being replaced by annual species with less nutritional forage value for animals.

Sheep grazing on rangeland in southern Iraq

The MOA is ostensibly responsible for the administration and management of rangelands in Iraq, and has made attempts to halt their deterioration and that of watersheds in some areas by installing livestock water facilities, rock check dams in eroded drainage channels, and contour furrowing with plantings of grass and trees. However, the ARDI assessment found that, even on projects that were less than two years old, there was evidence of heavy grazing use, giving the new seedlings little opportunity to get established and reproduce. These efforts have had only limited success as the underlying issue of unmanaged, intensive, year-round livestock grazing has not been addressed.

Although the MOA has responsibility for rangelands, in practice there is very little government involvement in administration and management them. No grazing use areas have been established, the government does not collect fees or issue permits, nor does it supervise use or establish carrying capacity for lands. There is not presently much capacity within the MOA for rangeland management. Very few managers have formal rangeland management training or education, nor do those skills exist at the local level. Presently there is not an effective extension or outreach service to bring rangeland management training or assistance to the local population or livestock breeders. In practice, management and use of rangelands tends to be controlled at the village level by the village council, which determines grazing use primarily based on local customs, and with no coordination on local, regional, or national levels.

In order to catalyze cooperation between stakeholders on a national level, ARDI sponsored a national rangelands management workshop in May 2006. This

workshop was attended by 64 participants from all over Iraq, representing the MOA, NGOs, community leaders, and livestock breeders. The participants expressed concern over the current state of rangelands in Iraq and a desire to work together to develop a strategy for better rangelands management. After much discussion, and with guidance from an ARDI management specialist, the following recommendations were developed by consensus:

1. Develop legislation, policy, and regulations specifically for rangelands in Iraq.

   While at least two laws currently exist to address usage of pasture and forest lands, it does not appear that they are applied. There was strong consensus from participants in the Rangelands Workshop that a separate law, along with a decisive policy statement and comprehensive grazing regulations, are needed for the MOA to administer rangelands effectively. The law needs to clearly define the role of government in protecting and administering the government lands and to set a direction for modern land use practices. Land tenure for existing users and direction for permitting use must be addressed in the new regulations.

2. Elevate grazing administration to the Director General level in the MOA.

   The status of rangeland management should be elevated to a Director General level within the MOA, as well in the governorate and district organizations, in order to provide better focus and budget advocacy for the rangeland program. Joint efforts for rangeland management, training/extension, and animal health could more easily be coordinated and implemented if rangeland management was on a par with other agriculture Directors General.

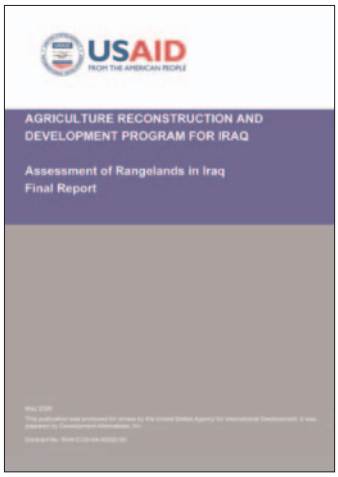
3. Expand training and outreach.

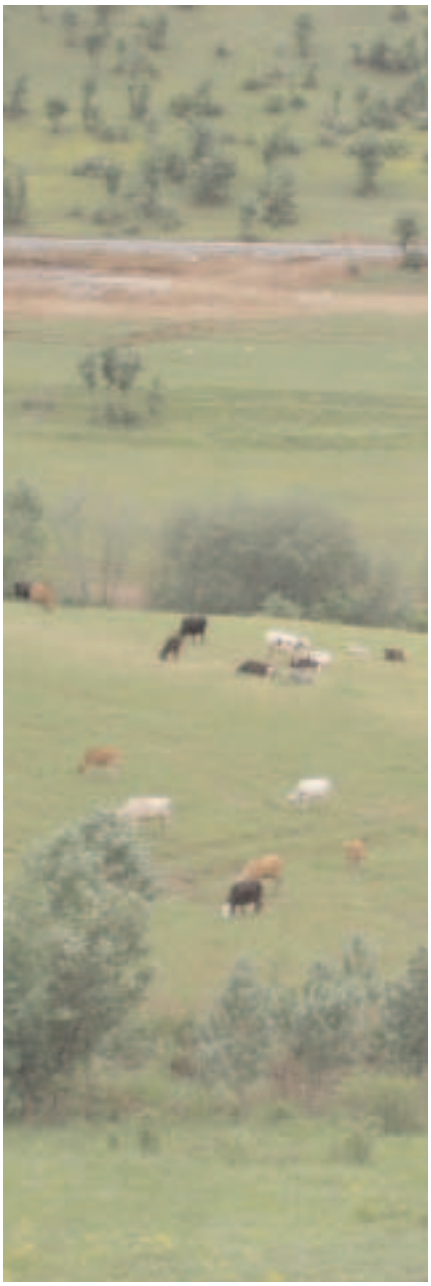
   There is a noticeable absence of professionally trained and educated Rangeland Managers in the MOA. A serious effort must be undertaken to recruit, develop, and retain staff with university training and field experience in range science, natural resource management, watershed management, land use planning, and animal science, to enable the MOA to function as a modern, effective rangeland management agency. Currently, these curricula are not available at any of the universities in Iraq.

4. Rebuild veterinary services.

   There is a pressing need to rebuild a robust, cost-effective veterinary services program in Iraq. Poor animal health prevents breeders from having productive livestock herds that provide adequate income. Little attention is presently given to preventive medicine, parasite control, and clinical care for diseased animals.

   In the past, most of Iraq enjoyed the benefits of an effective veterinary services program administered by the MOA. In recent years, due to war and other interventions, this service has been severely curtailed and the health and productivity of the livestock in the country has declined significantly as a result. This issue was clearly articulated by participants at





Rangelands in the foothills of the mountains in the North.

the Rangelands Workshop. A collaborative effort between the rangeland program, animal science, veterinary services, the private sector, and extension services to rebuild an effective animal health strategy would benefit all parties wishing to improve rangelands and animal production. An emerging private veterinary industry and its entailed associations could play a very important role in meeting some of Iraq's animal health needs. See Section 2.5 for more on ARDI efforts to rehabilitate Iraq's animal health infrastructure.

5. Convert excess wheat and barley acreage to green livestock feed, tame pastures, and native rangelands.

   The conversion of some surplus and abandoned cropland near villages into green feed (alfalfa, clover, grass), tame pastures (native grass, alfalfa, and other legumes), and native rangeland (native grass and vetch) would increased forage production. The best opportunities to implement this conversion exist in the northern governorates, where adequate rainfall and productive soils occur. See Section 2.5 for a discussion of ARDI projects to increase forage crop production for livestock feed.

6. Reconsider the existing prohibition against the export of sheep from Iraq.

   The present prohibition against the export of sheep from Iraq may be denying breeders the opportunity to increase their income substantially without increasing their herd size. The prices paid for Iraqi lambs in neighboring countries are reportedly three to four times higher than the prices being paid in Iraq. If breeders and farmers could benefit from higher prices for their products, they would be more receptive to changing their operations in ways that would improve the rangeland and watershed conditions.

7. Establish pilot/demonstration projects to teach, demonstrate, and integrate land use planning, grazing management, livestock production, and farming practices into a profitable agricultural enterprise.

   The MOA should select one or more village areas in both the north and south of Iraq to test and demonstrate the ecological, economic, and social benefits of integrating land use planning, farming, grazing management, and livestock management into land use decisions that are developed and implemented at the village level. The villages selected should already practice farming, grazing, and livestock production. Village leaders, farmers, and breeders should be engaged, possibly through a steering committee/advisory group, in a structured land use planning effort that would include an assessment of existing practices, an inventory of available resources including both natural and human resources, and the identification of desired future conditions that could realistically be achieved with improved management and commitment. The use of a Graphic Information System (GIS) would aid this effort a great deal.

IMPROVING BUFFALO PRODUCTION BY INCREASING REPRODUCTIVE EFFICIENCY

Buffalo departing the village for grazing during the day.

Buffalo production represents a large proportion of overall livestock breeding and production activities in Iraq. It is estimated that there are 500,000 head of buffalo in Iraq, with most in the central and southern regions. Buffalo holders gain income from the sale of buffalo meat and milk. Buffalo milk is used to make a yogurt that is preferred by Iraqi consumers.

A major problem faced by buffalo holders in Iraq is low reproductive efficiency, caused by failure of female buffalo to ovulate. There are two causes for this problem. The first is poor nutrition: when female buffalo have poor body condition due to poor nutrition, they are not able to enter estrus and mate. The other cause is the anestrus cyclicity that occurs during the hot season in Iraq, and prevents estrus and mating. This low reproductive efficiency reduces production, as calves are not produced to sell for meat (males) or to replenish the herd (females). In addition, buffalo that have given birth produce more milk, which is also a source of income for holders.

In order to improve the reproductive efficiency of buffalo, and increase production and income, ARDI implemented projects in central and south-central Iraq to increase successful pregnancies through improved nutrition and hormone treatments. A total of nearly 1,750 buffalo owned by 634 holders were treated by the projects.

A buffalo holder injects her buffalo with hormone treatment to induce estrus

IMPROVING REPRODUCTIVE EFFICIENCY IN BUFFALO THROUGH HORMONE TREATMENT

Buffalo production in Iraq is characterized by seasonal breeding. During the hot season in central and south-central Iraq there are almost no incidents of estrus (ovulation) in female buffalo, resulting in an average intercalving period that can reach eight months or more. In this case it is impossible for buffalo to calve during the peak months of two successive years and calving may be missed altogether in some years. This reduces the income that buffalo holders gain from the sale of calves and milk from calved buffalo. It also results in reduced herd sizes, as herd replacement rates are lower.

ACTIVITIES

Hormone treatments can enable female buffalo to enter estrus during the hot season, reducing anestrus cyclicity and improving reproductive efficiency. ARDI introduced a program of hormone treatment and improved nutrition in central and south-central Iraq. The hormone – Human Chorionic Gonadotropin (HCG) – is an inexpensive treatment that induces estrus in buffalo, even during the hottest months of the year. This treatment is practical, easy, and low-cost, and owners can easily perform it. ARDI paired the hormone treatment with improved nutrition to increase rates of successful conception and pregnancies.

ARDI implemented the program in the summers of 2005 and 2006. In 2005, we treated a total of 346 buffalo owned by 125 holders in Baghdad, Muthanna, and Thi-Qar governorates. In 2006, ARDI treated a total of 400 buffalo owned by 119 holders in Baghdad and Qadissiya governorates. Our staff met with local leaders to select the buffalo holders to participate in the program, and visited each holder to administer the hormone treatment to the buffalo. ARDI also gave the holders a supply of barley feed for the buffalo during mating and early pregnancy.

RESULTS

ARDI staff visited the buffalo throughout the duration of the project in order to measure rates of successful estrus and mating, as well as rates of pregnancy. In 2005, the treatment was successful in increasing average rates of estrus and mating to 84% and rates of pregnancy to 77% in a population of buffalo that would normally have a near zero mating rate during the hot season (see Table 72). In 2006, rates of estrus and mating were improved to 87% (see Table 73). Rates of pregnancies in this 2006 project will not be known until after the publication of this report.

The economic benefits of using hormone treatments in the hot season are significant. The investment in the hormone is $3, and the cost of improved diet for one buffalo during mating and early pregnancy is $42. With this $45 investment, breeders have a more than 80% chance of a pregnancy and calving, which will bring approximately $70 from the sale of the buffalo calf at weaning, and $620 from the sale of milk from the calved buffalo in the first month after birth. This $645 profit per calved buffalo is a significant increase in income, particularly since without the hormone treatment the breeders would have no pregnancies or calf production during the hot season.

At the conclusion of the project, ARDI held a field day with area breeders in all

TABLE 72 BUFFALO HORMONE TREATMENT, SUMMER 2005

Governorate	Number buffalo	Number owners	Estrus and Mating Rate (%)	Pregnancy Rate (% of Mated)
Baghdad	132	48	91	85
Muthanna	107	23	80	82
Thi-Qar	107	54	81	67
Total	**346**	**125**	**--**	**--**

three governorates in order to demonstrate the results of the program. The field days were attended by buffalo holders who participated in the program, as well as area breeders. There was considerable interest among the breeders in the hormone treatment.

TABLE 73 BUFFALO HORMONE TREATMENT, SUMMER 2006

Governorate	Number buffalo	Number owners	Estrus and Mating Rate (%)
Qadissiya	250	60	84
Muthanna	150	59	90
Total	**400**	**119**	--

Buffalo in the marshes are often fed reeds and other aquatic plants as part of their diet.

IMPROVING REPRODUCTIVE EFFICIENCY THROUGH IMPROVED NUTRITION

Inadequate nutrition has a negative effect on buffalo reproductive efficiency and the overall health of buffalo herds in Iraq. Most buffalo holders nourish their animals on wheat bran and cotton seeds, and in most cases on only small amounts of nutrition or green roughage. This poor nutrition is one of the main causes of low milk production, long intercalving periods and delays in the onset of puberty, all of which contribute to low reproductive efficiency and production losses leading to reduced income. Improving nutrition during the premating period stimulates ovulation and conception, and improving nutrition during the late gestation period increases the birth weights of calves and increases milk production from the calved buffalo. These improvements increase breeders' income from the sale of this increased meat and milk production, and also increase herd sizes.

ACTIVITIES

Beginning in September 2005, ARDI began working with buffalo holders in south and south-central Iraq to introduce the use of an improved diet of barley grains to premating and pregnant buffalo to improve reproduction. ARDI distributed this improved feed to 390 holders in Baghdad, Muthanna, Thi-Qar, and Basrah (see Table 74). Buffalo received feed for three months premating, and pregnant buffalo received the feed during the last three months of gestation. ARDI monitored the buffalo through the duration of the project and took measurements including birth weight of calves, average milk production of calved buffalo, and average rates of estrus and pregnancy in premating buffalo. ARDI

A buffalo feeding in southern Iraq

staff also took measurements from area buffalo that received average nutrition, for purposes of comparison.

RESULTS

The improved nutrition in pregnant buffalo was successful in increasing average calf birth weight to 42.75 kg, a 30.5% increase over the area average of 32.75 kg. This increase in birth weight means that the calf is more likely to be healthy, and if weight is maintained to weaning the calf will bring a higher price in the market. The pregnant buffalo that received improved nutrition also produced more milk after birth, an average of 11 kg per day, an increase of 76% compared to average area milk productive of calved buffalo of approximately 6.25 kg per day. This increased production is good for the health of the calf, and also represents an increase in income for the holder, as buffalo milk is a valuable commodity that brings a high price at market. (see Table 75)

In the premating buffalo, the improved nutrition was successful in achieving an estrus rate of nearly 63% in treated buffalo. The average pregnancy rate was 78% across all governorates, an increase of 30% over the normal pregnancy rate of 60% of mated buffalo (see Table 76).

TABLE 74 BUFFALO NUTRITION PROJECT IMPLEMENTATION BY LOCATION

Governorate	Number of Holders	Number of Buffalo		
		Total	Pregnant	Pre-mated
Baghdad	21	100	50	50
Muthanna	119	350	165	185
Thi-Qar	145	350	165	185
Basrah	105	200	100	100
Total	**390**	**1,000**	**480**	**520**

TABLE 75 BUFFALO NUTRITION RESULTS FOR PREGNANT BUFFALO, 2005 AND 2006

Governorate	Number of Pregnant Buffalo	Average Calf Weight at Birth (kg)		Average Milk Production (kg)	
		Program	Area	Program	Area
Baghdad	50	45	30	13	5
Muthanna	165	43	33	9	5
Thi-Qar	165	40	33	13	9
Basrah	100	43	35	9	6
Average % Improvement	**--**	**30.50%**		**76%**	

TABLE 76 BUFFALO NUTRITION RESULTS FOR PREMATED BUFFALO, 2005 AND 2006

Governorate	Number of Pre-mated Buffalo	Average Rate of Estrus (%)	Average Pregnancy Rate (%)	
			Program	Area
Baghdad	50	94	88	60
Muthanna	185	92	82	60
Thi-Qar	185	91	73	60
Basrah	100	62.8	69	60
Average % Improvement	**--**	**--**	**30%**	

AVIAN INFLUENZA

H5N1, Avian Influenza struck Iraq in early 2006. Human to human (H2H) cases were documented. Hundreds of thousands of chickens were immediately culled.

During the fall of 2005, there was increasing evidence of an outbreak of avian influenza (AI) in the region. Along with cases detected in southeast Asia, infected birds had been found in eastern Europe, and it appeared that the outbreak was spreading eastward across Europe and into central Asia. This was alarming news, because avian influenza, H5N1 is a zoonotic disease, which has been known to be transmitted from birds to humans. The most virulent strain of the disease is deadly to humans, and since domestic poultry (especially geese, ducks, and chickens) are common carriers, populations who keep uncaged chickens (backyard poultry) are especially at risk. Indeed, after reports of human infection with bird flu in eastern Turkey, the first cases were confirmed in Iraq, in the northern regions.

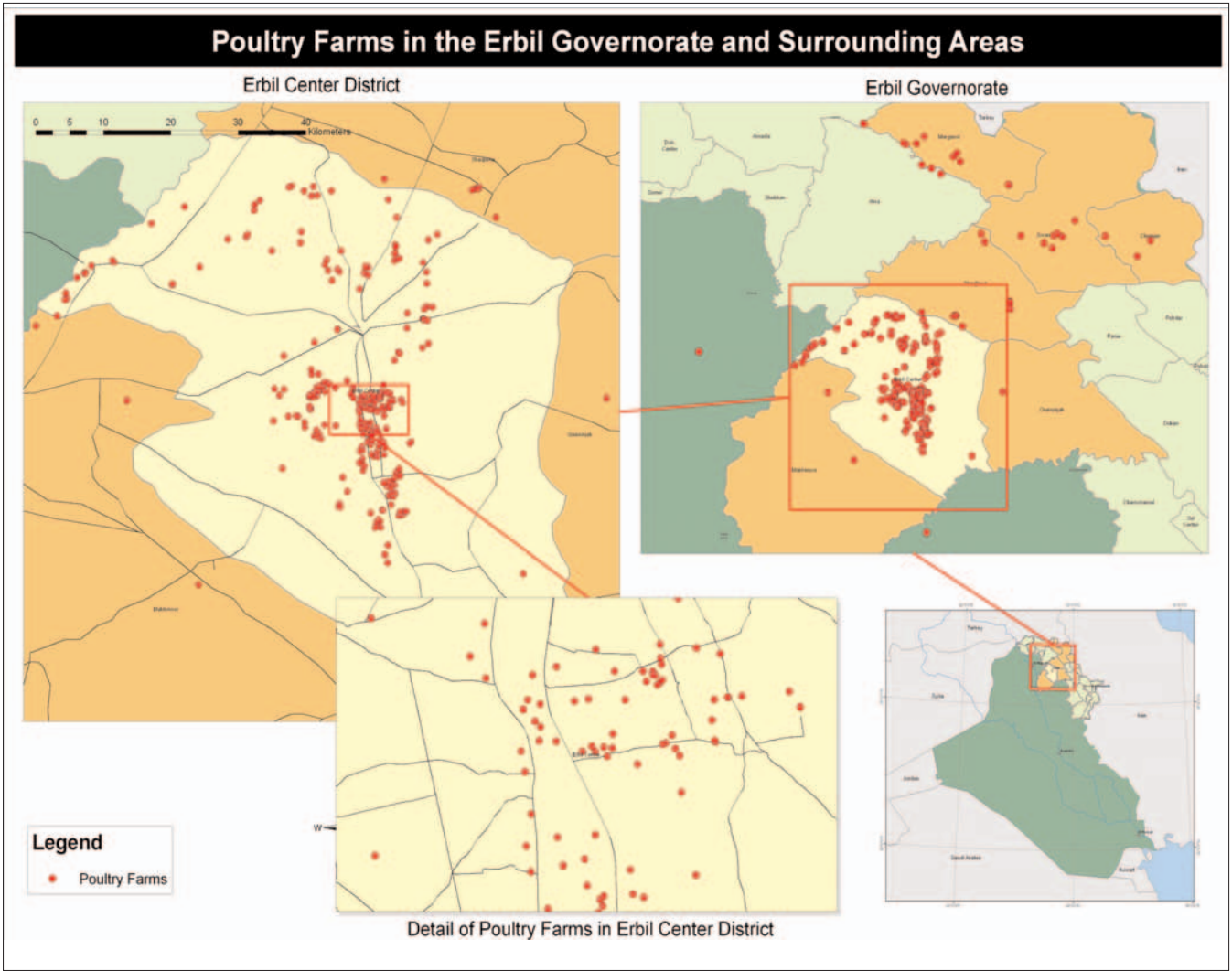
In October, an Interagency Avian Influenza Working Group was formed by the USG to assist the Government of Iraq to mobilize technical and program

Avian Influenza experts responding to the outbreak of a poultry farm outbreak in Iraq.

Autopsy photo from the world's first confirmed case of feline H5N1 occurred in Iraq. This established that sick cats might be a sentinel for AI.

resources in response to the outbreak. ARDI was particularly active in this effort as the prime representative of USAID in the group. ARDI mobilized rapidly to meet the challenge. The first efforts focused on improving monitoring and surveillance activities and enhancing the Ministry of Agriculture's preparedness for possible avian influenza outbreaks. These efforts were followed by other measures, which included specialized assistance for Iraqi professionals, grass-roots campaigns to educate the farming population, and the formation of a broad coalition of stakeholders from different ministries, agencies, NGOs, and international partners to form a coordinated response to avian influenza on a national level.

ARDI worked in close partnership with the Ministry of Agriculture on the avian influenza project. The MOA had primary responsibilities for these efforts since the most likely sources of the disease were on family farms in rural areas. The poultry industry is of great economic importance in the country, and formed a substantial part of the income of millions of rural Iraqis throughout the country. In fact, with the first rumors of the presence of the disease in the countries, authorities were forced to close bird markets and prevent the transport of live birds. These restrictions, combined with general concern throughout Iraq over the local cases, caused immediate declines in the poultry market, and threatened to have severe economic consequences for Iraqi farmers.



One of ARDI's recommended responses to the Avian Influenza crisis was to survey all poultry farms in the vicinity of the current outbreak permitting targeted education and swift response to future outbreaks.

One of ARDI's first activities was to assist the MOA/Erbil in the formation of veterinary-agriculture surveillance teams. These teams were trained to collect samples from farms where dead poultry had been reported, and test those samples for the avian influenza type A virus, which could be indicative that birds carried the deadly H5N1 strain of the disease. An essential part of the training was to prepare team members in the proper use of global positioning systems (GPS) equipment in order to pinpoint the exact locations of inspections and cases identified and map the spread of the disease. Team members were also furnished with personal protective equipment kits and disinfectants, to prevent the transmission of the disease to team members and prevent the spread of the disease between farms during inspection visits. At the same time, ARDI worked with MOA authorities to devise a plan for reimbursing farmers in the case that flocks needed to be culled.

Since the sophisticated laboratory facilities needed to identify the specific strain of virus did not exist in Iraq, ARDI helped to establish linkages between the Government of Iraq and the US Naval Medical Research Unit No. 3 (NAMRU-3) based in Cairo. ARDI sponsored travel for a group of Iraqi veterinary scientists to the NAMRU-3 laboratories in Cairo for training in diagnostic procedures for AI in Iraq. Soon afterward, ARDI identified an international expert in the epidemiology and prevention of AI, and sponsored his visit to Iraq

Attendees at the National Avian Influenza Conference, April 2006.

to consult with MOA and Veterinary Services personnel about initial needs, surveillance methods, and prevention strategies.

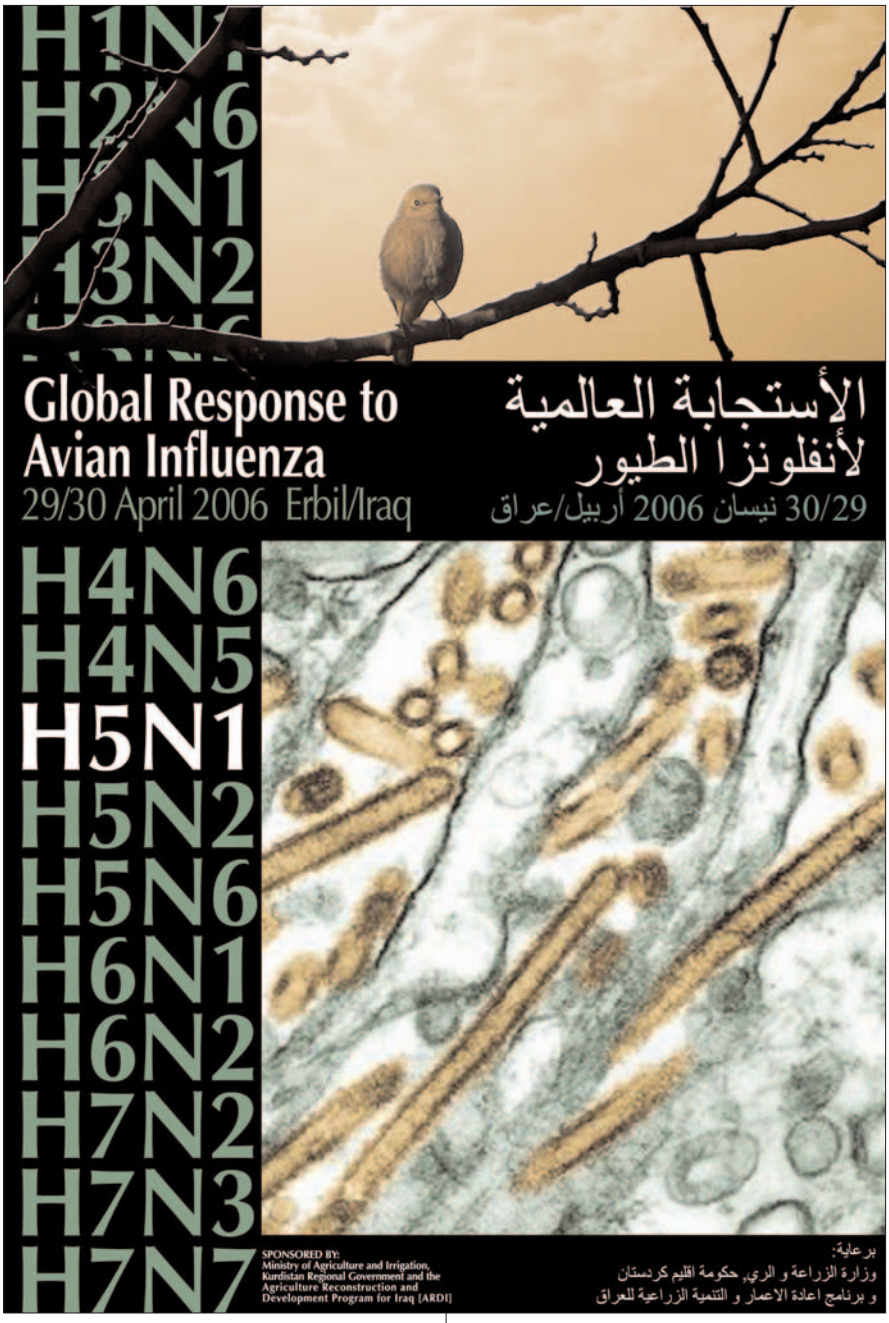
At the same time, ARDI took steps to inform farm families about risks, identification and prevention through a community education project aimed, in particular, at women, who bear most of the responsibility for managing small animal production activities on the farm, and who also care for the health of their families. At present there is no vaccination available for H5N1. One essential measure to prevent its spread is to educate poultry owners on how to care for their animals and avoid infection, since poultry owners often lack adequate information of poultry health and management.

ARDI already had in place a very successful project aimed at educating farmers on the recognition and prevention of zoonotic diseases in general (see Section 2.5), and it was appropriate to adapt this educational campaign to target avian influenza in particular. Working through a local NGO, ARDI mobilized teams of veterinarians, animal production specialists and public health officials to work together to deliver workshops in each village. ARDI trained these teams in participatory extension methods, including the use of extension materials such as posters and brochures, to maximize the impact of the training workshops.

The initial education project for zoonotic diseases had already reached a total of

1,125 villages, offering workshops for nearly 20,000 people, each of whom represented a farm family. However, these workshops covered AI along with all other principal zoonotic diseases such as brucellosis, mange, echinococcus and tuberculosis. The revised workshops were focused specifically on bird flu, and the teams reached an addition 720 villages in the governorate of Sulaymaniyah, the geographical center of the Iraqi outbreak. These workshops provided training for a total of 7,535 men and 7,948 women.

In May of 2006, ARDI, in conjunction with the MOA/ Erbil, sponsored a *National Avian Influenza Conference* in order to bring the various stakeholder groups together to build commitment to work towards a coordinated and strong national response to avian influenza. The conference was attended by over 120 people from 17 governorates, including senior government officials from Baghdad, Erbil and Sulaymaniyah; poultry producers; over 40 representatives of 23 NGOs working in agriculture across Iraq; and international organizations closely involved with the effort.



H5N1 Conference Poster

The conference began with a presentation of the Government of Iraq's current National Plan for Avian Flu response. The GOI of Iraq developed this plan based on information available from other countries, much of which is geared towards large-scale commercial poultry production sectors. In Iraq, however, there are large numbers of "backyard" poultry producers who raise chicken and other birds on a small-scale, and pose unique challenges in the event of an avian influenza outbreak. For the remainder of the conference, the stakeholders worked in a series of mixed working groups to develop recommendations to address Iraq's unique circumstances and improve the national response to avian influenza.

The working groups formed during the conference determined that the national response must give major attention to backyard poultry production, including the finalization of a compensation plan for poultry culling, to assure that poor producers would notify authorities when they suspect they have infected poultry. In addition, these backyard producers need technical assistance to

Infected backyard chickens from Iraq's 2006 outbreak of H5N1.

implement the use of chicken coops to encourage a transition away from free range production (and concomitant contact with wild birds) toward enclosed or fenced structures, which can help reduce transmission and prevent widespread outbreaks. These measures also reduce contact between the birds and family members, especially small children.

In addition, all stakeholder groups agreed that it is necessary to reassess and revamp the public awareness programs for avian influenza, in order to increase awareness and maintain consistency in the information that is disseminated. Awareness campaigns must be coordinated with messages that target specific audiences with relevant information. For example, consumers need to receive accurate information about how to safely consume poultry products, while backyard poultry producers need information about how to protect their poultry and recognize the signs of infection. This coordinated awareness campaign can be implemented throughout Iraq through government extension services, NGOs, civil society groups, associations, cooperatives, unions, and religious leaders. It was determined that the media needs to play a more active role in the dissemination of information, particularly in the announcement of confirmed outbreaks and human cases. This will help promote government transparency and build trust in the national response to the problem.

The final major recommendation of the *National Avian Influenza Conference* was to strengthen the technical capability of the Government of Iraq to respond to an avian influenza outbreak. The specific recommendations from the conference working groups on improving this technical capacity were as follows:

- The GOI must establish procedures for factually based, rapid response messages to increase the public's confidence in the government's handling of avian influenza. The awareness campaigns will play a large role in this effort.
- The GOI should also establish a laboratory that meets international standards that can be used for avian influenza diagnostic work and to train veterinary laboratory staff. In addition, the GOI must improve its surveillance program to enable rapid identification and containment of avian influenza cases. The number and reach of the teams should be increased, and training on collection and bio-security for veterinary staff and other government field workers should be improved. Clear guidelines must be developed for collection of field samples, bio-security of samples, and shipment to laboratories.
- The GOI should also send veterinarians to monitor poultry markets at least monthly, and develop monitoring guidelines for slaughter houses and commercial poultry farms.

The conference concluded with a consensus that there must be additional coordination between the GOI, civil society and NGOs in the response to avian influenza in Iraq.