

FORAGING FOR NEW OPPORTUNITIES IN THE DAIRY SECTOR

Growth in demand for products from dairy livestock is making Pakistani smallholder farmers essential to national aspirations to raise productivity and reduce rural poverty

KEY POINTS

- Farm-practice innovation in Pakistan's dairy sector is creating multiple new avenues to increased income.
- Preceding the changes to on-farm practices was innovation to the content and delivery of extension messages.

BY GIO BRAIDOTTI

An 'innovation hub' embedded within Pakistan's agricultural extension system has helped improve incomes among the many smallholder farmers in the Punjab and Sindh regions that contribute to Pakistan's economically important dairy industry.

As the world's fourth-largest milk producer, dairy is the biggest livestock sector in Pakistan, valued at Rp 360 billion annually (equivalent to A\$8 billion in 2016 figures). Remarkably, farmers with up to 10 animals each make up about 90% of the dairy population.

While total milk production has increased about 5% a year for the past 15 years, demand is anticipated to more than treble by 2020, requiring a faster boost in production.

Since 2006—when ACIAR launched its first dairy-sector project—growth in demand for milk has been exploited as an opportunity to reduce

rural poverty by helping smallholder farmers to improve productivity. The ultimate aim is to translate those gains into greater household income and accelerated rural development.

From the start, ACIAR team members made use of the fact Pakistan has an established extension service for dairy farmers that incorporates village-based veterinary officers.

The capacity of this system was further boosted through linkages with Australian researchers and research infrastructure provided through a Pakistan-based extension innovation hub.

The hub aids in the ability to identify on-farm production and marketing constraints, detect omissions in extension services, trial new solutions and develop suitable training material for not only farmers but also extension field officers and the schools that teach the children of farming households. The hub also makes it possible to form connections with the right academics when research is needed to solve production problems or assist with emerging opportunities.

Innovations emanating from the hub have been instrumental in achieving higher adoption rates of key production innovations based around fodder, nutrition and animal welfare. The result has been healthier herds that are linked to increased milk production of 1 to 2 litres per animal a day, which is especially impressive given that the

average production level for subsistence farmers is at most 3 litres of milk per animal a day.

Central to the hub's establishment was a team based at Charles Sturt University, headed by now-retired Professor Peter Wynn and the project's Pakistani project leader, Dr Hassan Warriach from the University of Veterinary and Animal Sciences.

The project is currently led by Dr David McGill, who in 2007 travelled to Pakistan in the role of project manager. Dr McGill established a base for the project in Lahore, where he lived for nearly three years, creating the relationships with Pakistani partners that are thriving to this day.

"We stepped into a system where field officers had discussion groups established, but these were for men only and we noticed two things," Dr McGill says. "The first was that adoption rates were not as high as they could be. The second was that the excluded household members were actually playing important roles rearing and looking after dairy herds."

A novel way was found to solve issues around gender exclusion. Crucial to these efforts were the young Pakistani interns and students who travelled to the farms with a male colleague, gained the confidence of households, and



PHOTOS: DAVID MCGILL



Above: Interns from the University of Veterinary and Animal Sciences (UVAS), Nimra and Shireen (foreground), and Irfan (UVAS Masters student) working on a calf-rearing trial to determine the most profitable feeding strategies for male calves.

Left: ASLP dairy area adviser, Dr Sobia Majeed (right), working with a group of farmers in Sindh on milk value addition.

established discussion groups for women.

Included are women such as Sobia Majeed, Zahra Batool, Shumaila Arif, Khadija Javed, Zunaira Akram and Nabila Murtaza who worked with female farmers in Sindh and Punjab provinces.

Dr McGill describes the gains these women achieved as “incredible”, demonstrating the kind of initiative, intelligence and panache that saw many offered scholarships from around the world to continue their studies. Included is Zahra Batool who recently started a PhD in Melbourne.

“The women who worked on the ground were instrumental in achieving impressive husbandry and milk production gains,” Dr McGill says. “Additionally, women were identified at each site to take on an organising role—the go-to person for that village who plays an analogous (but unpaid) role for the women groups to the one provided to the men by the village-based veterinary officers.”

The benefits are not restricted to the Punjab and Sindh provinces since the innovation hub developed training sessions for extension officers from other provinces. Dr McGill says these workshops—which included theory, practicals, farm visits and debate—were based on farmers’ needs relative to the time of season.

The extension messages centred on three core principles—nutrition (especially fodder), health

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and animal management—based on a central message: what is good for the animal is good for milk production.

“Part of what we did was to acquire a feel for what people knew and what recommendations we needed to promote,” Dr McGill says. “In turn, that required understanding the farm system.”

An example was the observation that dairy herds often co-exist with cropping systems.

As a result the practice of relying on wheat, sugarcane, maize or rice straw by-product to feed cattle was widespread but created shortfalls of fodder, especially between seasons.

“People didn’t see dairy nutrition as important, as it is perceived that cash crops earn the larger income,” Dr McGill says. “We recommended staggered sowing of fodder that can be harvested every other week. This, however, was not popular with farmers, as fodder seed was scarce and of poor quality.”

In response, the innovation hub explored the possibility of establishing village-based fodder seed businesses. Included were fodder trials to compare seed quality from imported sources, established Pakistani suppliers, and the Fodder Research Institute (which breeds improved varieties). These were undertaken by Shoab Tufail in the form of a PhD project in which he excelled at drawing farmers into the research activities.

The results were clear-cut and made widely available: the improved varieties from the Fodder Research Institute performed the best, producing up to three times as much forage with the potential to double the amount of seed produced.

“We found that if farmers ran a forage seed business they can make money—up to four times the value of a cash crop,” says Dr McGill, referring to research results from Mr Shoab’s PhD project. →

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A pilot program has given villages around Okara support to trial seed enterprises, achieving impressive uptake rates (up to 50%). In support of these enterprises, different groups of farmers have participated in research to explore the value to their enterprises of various forage species, such as berseem (Egyptian clover).

Income-earning opportunities based on improved nutrition are just one example of how improved animal management can be profitable. An extension module was developed to promote cow comfort as a means to raised productivity.

Additional gains were made possible by simple measures, such as untethering animals, building fences and allowing them to roam within small enclosures where animals have free access to water and feed, shade in summer and warmth in winter.

Work is now under way to develop an app-based decision-support tool on animal health. The idea is for farmers to record some simple measures about their animals on their phones. That data can then be compared to a database to determine the best inputs and actions to improve the animals' ability to produce milk.

Additional income-earning opportunities for farmers have also been identified in the form of an emerging market based on increased demand for beef from an urban middle class.

"If the animals are treated well, then the same extension message will work for beef production," says Dr McGill, who is continuing his involvement in the international sector from his new base at the University of Melbourne. "We can even tailor the message to adapt nutrition regimes suited to marketing male cattle for beef."

All the extension messages are being packaged to develop resources suitable for all the key stakeholders: field officers, both male and female farmers, and children, including classroom activities.

"We now have extension modules that work and a sense of the research questions we need to ask," Dr McGill says. "I am now keen to explore which Pakistani organisations are in a position to take on the roles the innovation hub would play in the next phase without support from Australia." ■

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MULTIMEDIA: Along with a group of other early-career researchers working on similar projects, Dr McGill has helped to establish the RAID (Researchers in Agriculture for International Development) network: www.raidaustralia.net

BEES AND THE DAIRY INDUSTRY

BY SHOAIB TUFAIL

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The majority of Pakistan's nine million smallholder dairy farmers are subsistence farmers, with fewer than five animals on 2 to 3 hectares of land. Livestock productivity is generally low. In recent years, dairy farmers became aware of the need to produce quality green forage to feed their milking herd. As a result the demand for seed has increased dramatically, yet the formal seed-supply system in Pakistan is able to supply only about 10–20% of farmers' needs.

To overcome shortages, the Pakistani Government invests more than Rp 300 million (A\$40 million) on berseem clover (*Trifolium alexandrinum* L.) seed imports each year. Berseem clover accounts for more than half of Pakistan's annual green fodder needs, particularly over the winter and spring months.

A project led by Charles Sturt University (CSU), in partnership with ACIAR and the Pakistan Government, is providing important support for the development of a vibrant alternative to the formal seed-supply system for smallholder farmers. This project uses a participatory approach that engages farmers and their communities in the establishment of village-based forage seed enterprises (VBFSEs).

VBFSEs are enabling farmers operating at the margin of profitability to diversify their practices, bypass high-cost multinational seed companies, and produce high-quality berseem clover and seed products on site. The approach also gives farmers ownership and control over the supply of the forage seed that is so important to their financial sustainability.

Through the project, farmers learned the art of varietal selection, seed production and the importance of bees for pollination, while researchers investigated the impact of introducing honey bees at the smallholder farm level to maximise berseem seed production.

Pollination plays a vital role in berseem seed-setting and honey bees are the principal agents, accounting for 88% of total insect visitors. Globally, honey bee populations are declining due to the widespread use of neonicotinoid pesticides. In Pakistan, neonicotinoid pesticide is used extensively both in the form of spray and as a seed coating over a range of crops including wheat, rice, cotton and orchards to protect against sap-feeding insects such as aphids. These toxic insecticides



are decimating honey bee populations to the point where, in some cases, effective cross-pollination of crops is not possible.

The impacts are visible on berseem clover yields. Research found that by carefully selecting seed, farmers could produce up to 13 tonnes of forage dry matter and 420kg of quality seed from one hectare of land. Remarkably, the research also found that the introduction of bees in a netting system increased the seed yield of berseem clover by 113% when compared with conventional open pollination.

Clearly there is a major shortage of bees naturally present in the field trial environment. As a result of bee pollination, income generated from seed production alone was Rp 112,635 (A\$1500) per hectare. The most productive and viable strategy for berseem VBFSEs is achieved by combining the use of an improved research station variety (Agaitti berseem-2002) and honey bees (2 to 3 hives/ha) for maximum returns per unit area.

As a result of the project, five VBFSEs have been successfully developed in the Kasur and Okara districts of Punjab. They produced a total of 870kg of quality berseem seed that is sufficient to plant 40 hectares of land in a single season. The new seed entrepreneurs generated an income of up to Rp 420,000 (A\$5600) per hectare both from fodder and seed, which is three to four times higher than farmers could earn from any other cash crop grown in the region.

The project and its outcomes have exposed farmers to the value of participatory agricultural research and have opened farmers' eyes to the commercial opportunities that can support sustainability and lead to positive change. ■

ACIAR PROJECT

LPS/2010/007: 'Strengthening dairy value chains in Pakistan through improved farm management and more effective extension services'

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