Agricultural research is one of the premier areas of research excellence within the University of Tasmania. So it’s exciting that our first issue of Research to Reality for 2012 – a year that is being celebrated as the Australian Year of the Farmer – showcases several projects that are contributing to the further development of sustainable, innovative and prosperous agricultural industries and communities.

Professor Tom Ross’s study into the production of raw milk cheeses, along with the project by Colin Birch to improve the production and profitability of small crop holders in Papua New Guinea, are of particular note. These researchers are from the Tasmanian Institute of Agriculture (TIA), a joint venture between the University and the Tasmanian Government. This highly successful partnership combines scientific research, industry development, extension and agricultural education in one organisation – and is a model that has been adopted by other states.

As reflected in the projects highlighted in this publication, the scope of the University’s research seems vast, covering topics as diverse as school retention rates in rural Australia to wearable devices that encourage exercise. At their core, however, is a central commitment: the nurturing of knowledge and research excellence that will continue to carry our community into the future.

Professor Paddy Nixon
Deputy Vice-Chancellor (Research)
Nearly all of us love cheese, and consumers are constantly pushing producers for a greater range of flavours. Part of this demand focuses on unpasteurised (or raw milk) cheeses, which many believe have an unparalleled depth of flavour. Unpasteurised cheeses are also seen as being more diverse in character, allowing cheese makers to make cheese unique to their region – and to create lucrative niche markets.

Roquefort cheese made from raw milk can be found in Australian markets but is imported from France and produced under very strict processing controls. Australian and New Zealand food regulations currently prevent the production of almost all unpasteurised cheese because raw milk can contain harmful, or ‘pathogenic’, bacteria, which can cause illness – even life-threatening illness. While this is very uncommon, milk is made safe through the heating process of pasteurisation.

Associate Professor Tom Ross, from the Tasmanian Institute of Agriculture’s Food Safety Centre, is leading a study on the production of softer-style raw milk cheeses to determine how safe they actually are in comparison with pasteurised cheeses. This study has the potential to enable cheese makers to begin safely producing a wider range of raw milk cheeses.

“We’re looking to determine what are inherently safe cheese styles,” said Assoc Prof Ross. “We will define a set of cheeses that are relatively safe to make with raw milk, and conversely those which aren’t.”

The research team will initially study the survival of pathogenic bacteria in a simplified laboratory system that simulates cheese but, with a bit of guidance from a qualified cheese maker, will also make a variety of cheeses from milk deliberately contaminated with pathogens to measure the time taken to kill those pathogens. The research will observe and measure how the pathogens respond to the conditions in cheeses as they ferment and mature.

A complementary study led by Associate Professor John Bowman, also of the Food Safety Centre, will study the responses of the pathogens at a molecular level. Together, the two projects aim to work out whether some cheeses are safer than others (and why) and whether small changes in cheese processes could make the cheeses safer.
Dingoes and other wild dogs cause stock losses totalling millions of dollars in Australia every year. The conventional response to this costly problem has been to try and kill as many predators as possible, usually with 1080 poison. But this approach is limited in its effectiveness, and can also endanger wildlife.

There may be another answer – one that was used by shepherds in southern Europe and central Asia for thousands of years. Professor Chris Johnson and PhD student Linda van Bommel, from the UTAS School of Zoology, have been investigating the effectiveness of guardian dogs in protecting cattle, sheep, goat and free-range poultry in Australia.

Prof Johnson said guardian dogs were traditionally special breeds (such as the Maremma, Pyrenean Mountain Dog, and others) that were bonded to livestock as puppies.

“The dogs grew into adults who lived with ‘their’ livestock full time and kept away wolves, bears and thieves,” he said.

Knowledge of guardian dogs almost died out as fences replaced shepherding and wild predators were eradicated from most of Europe. But Australian farmers are now reviving the practice as a sustainable way to protect their flocks without harming the ecologically valued dingo, and other animals.

A particular challenge for guardian dogs in Australia is that our pastoral properties are often large. This study investigated how the dogs performed by interviewing 150 livestock producers.

In most cases, said Ms van Bommel, guardian dogs eliminated predation completely - in the rest, some losses continued, but at much lower rates than before. “Importantly, the study found that guardian dogs can be just as effective when ranging independently over large properties, and protecting large numbers of livestock, as they are when working on small farms under supervision,” she said.

“The main factor that determines effectiveness is the number of stock per dog. As a general rule, a guardian dog can prevent all killing of livestock when it has 100 or fewer animals to protect.”

This study was recently published in *Wildlife Ecology*. 

Guardian dogs were used by shepherds in southern Europe and central Asia for thousands of years – a practice that is now being revived by Australian farmers.

Funding for this research was provided by the Herman Slade Foundation and the W.V. Scott Foundation.
A new iPad app, developed by a team from the UTAS Faculty of Education, finally has kids having fun learning phonics. 

Profs’ Phonics, which is available through iTunes, is designed to help early readers decode the sounds of the letters in the alphabet. Teachers often need additional resources to teach early phonics and phonemic awareness, reported UTAS Dean of Education Professor Ian Hay and Associate Professor Ruth Fielding-Barnsley. Teaching resources in this area are often limited and of a poor quality.

“This app works on phonemic awareness, which is one of the early stages of learning to read,” Prof Hay said. “It helps early readers match sounds to letters. In the past it’s been seen as an uninteresting part of learning to read. We’ve overcome this by having a professional artist work with the app developers so that images and sounds are highly correlated to provide stimulating and motivating activities for children.”

The app gives children an iPad/iPhone screen full of engaging illustrations of things starting with the same sound: for example, a panda, a painter and a princess (all starting with the sound ‘p’). The child touches an individual picture and, if it starts with ‘p’, the full word flashes onto the screen.

This first app covers five sounds: four consonants and a vowel. A second app, which is currently in production, covers a further 10 sounds in the beginning, middle and at the end of words. Professors Hay and Fielding-Barnsley note that other phonics apps have problems for Australian readers:

“Many of them have been developed by people who know about computer programming rather than linguistics,” Assoc Prof Fielding-Barnsley said. “Profs’ Phonics involves a positive approach with fast and high-quality feedback for the reader, which is an attractive feature for teachers and parents.”

The program is especially appropriate for students from low socio-economic areas and developing countries, where the foundations of reading may be poorly developed.

“Without strong foundations in early reading skills, children struggle throughout their schooling and later life,” Prof Hay added.

“Research evidence highlights that programs like this have a long-lasting impact on the academic progress of children who have come into formal schooling with poor early reading experiences.”

This research was partly funded by an ARC grant for early reading.
Kicking a goal for rural school retention rates

Most of us love our footy, but this research suggests that school retention rates could be improved by the promotion of a variety of leisure activities.

Left: PhD candidate Merete Schmidt spent close to three months in a rural classroom observing participants and conducting interviews with teachers, students, parents and policy makers.
Leaving school before the completion of Year 12 is a serious problem in rural areas. There is a 17 per cent difference between rural and urban retention rates, with young males significantly more affected than young females.

To improve these figures, we need to understand why young people make the decision to leave, said Merete Schmidt, who is in the final stages of her PhD on school retention rates in a rural Australian community.

Ms Schmidt, from the UTAS School of Sociology and Social Work, spent close to three months in a rural classroom observing participants and conducting interviews with teachers, students, parents and policy makers. She also looked at interactions within the school and the greater community. She found that in this community (which she named ‘Hillsville’) a highly physical form of masculinity was celebrated – in particular through sports such as football and the availability of manual labour. These dynamics were absorbed into the informal school culture, resulting in an attitude that valued physical practices more than intellectual ones.

“To some extent, disengagement from school work was seen as prestigious,” Ms Schmidt said.

But while many youths consciously made the decision to leave school early, they still associated this choice with failure. This suggests the youths had internalised their school’s message that educational qualifications are crucial for their future economic and social success. Sadly, they were unable to embrace it. Other students, particularly those uninterested in sports, were also highly likely to drop out because they felt marginalised in the social hierarchy.

“The students who felt most marginalised tended to make the decision to leave school early, even if they were doing really well,” Ms Schmidt said.

To help improve retention rates in rural areas, the research suggests that a wide variety of leisure activities should be encouraged, particularly those not related to sport. This will help challenge existing stereotypes and ensure that all young people have a chance to reach their potential.
It probably seems like only yesterday that Mum and Dad turned their backs on the city and moved the family to Tassie, hoping for a quieter (and simpler) life. But years later, what do the now-grown children of these rural migrants think of this move? Do they still see rural Tasmania as a better life? Or are they desperate to escape?

Elly Moreno, a PhD candidate at the UTAS School of Sociology and Social Work, is conducting one of Australia’s first cross-generational studies into rural migration. Her focus is on the Meander Valley region, which is known to economists as a near perfect place to live (for reasons such as housing affordability, proximity to a city and Deloraine’s vibrant, artistic community). Indeed, it’s also where Ms Moreno chose to settle when, 16 years ago, she migrated from Brisbane.

“I came to the State on holidays and absolutely loved it,” she said. “I needed to find a way to come back.”

For her project, titled Realities of rurality – a cross-generational perspective of rural life and amenity migration to Tasmania, Ms Moreno has been speaking with first- and second-generation rural migrants to the State’s central north. She is interviewing people who moved to the area between 1969 and 1991, when they were aged between 18 and 35 years, as well as the children of those migrants, who are now in the same age group.

So far she has found the children of these migrants are understanding of the reasons their parents migrated, although many children have moved on to pursue travel and/or job opportunities. “Having parents who’ve already had that adventure, they’re actively encouraged to go off and see the world,” Ms Moreno said.

But this does not mean they’ve left for good. “Even though people I spoke to had moved to other places, there was still this big thing about moving back to this very special place,” she said.

Ms Moreno is currently halfway through her study, which is one of the first of its kind. Phrases such as “rural migration” or “sea change” are relatively new, and migrant studies are only just beginning to investigate them.
Heart rate, number of steps, kilojoules burned – do exercise monitoring devices seem overly complicated to you? For those who answered ‘yes’, Patrick Burns is promising to keep it simple with his new invention, ActivMon.

Mr Burns has worked on developing a wearable device for increasing exercise levels since he began his PhD in the UTAS School of Computing and Information Systems and CSIRO. He said it is known that if people monitor their habits, they can change them. “If someone is interested in exercising more but they aren’t a gym junkie, then they don’t want a device that’s going to overwhelm them with too much information,” Mr Burns said.

“There is an assumption that you give someone a device that’s going to help them exercise or monitor their physical activity, that more information, more features and more complexity is better. “I have a hypothesis that maybe it’s better with some technology if we actually make it simpler.”

Mr Burns – whose area of focus is human computer interaction (HCI) – wondered what would be the smallest level of monitoring information needed to help a person increase their physical activity. The answer was the prototype of the ActivMon. The device is worn on the wrist and the movement of the wearer’s arm (when walking or running) is registered by a motion sensor. The ActivMon starts lighting up red and, as the user exercises to an acceptable level, it gradually turns from red, to orange, to green. The wearer can simply glance at their wrist and see how much they’ve done.

“You have to be mindful of what issues are going to either help people interact with these systems or, if the system is badly designed, prevent them from interacting,” he said.

Mr Burns’s next move will be to take the findings from the first study and redesign the device in preparation for a larger study. His PhD is co-supervised by Professor Christopher Lueg from UTAS and Dr Shlomo Berkovsky from the CSIRO Tasmanian ICT Centre.

Patrick Burns, whose area of focus is human computer interaction, has a hypothesis that some technology can be improved by reducing the number and complexity of its features.
A Faculty of Education PhD candidate has found that more flexible and creative software can help students create and understand difficult graphs and data.

Noleine Fitzallen’s project investigated TinkerPlots Dynamic Data Exploration, an interactive and dynamic graphing software program. Ms Fitzallen worked with 12 students who went through a series of activities over a period of six weeks. She looked closely at how they interacted with the software, as well as the mathematical learning they did along the way.

“With TinkerPlots, you can change the appearance of graphs, the scale, the type of icons, the colours and the graph type,” she said. “Unlike other kinds of graphing software, the students are in control of what they create – they can construct the graph that is most meaningful for them to try and answer the questions that they’re asking from the data.”

“It allows them creative input and thinking time, without them worrying about the mechanics of drawing the graph.”

While TinkerPlots is specifically for students in Years Four to Eight, Ms Fitzallen discovered it is useful up to Year 10 (and that students as young as Year Three have been able to use it easily).

“We were looking at co-variation graphs and that’s not really in the curriculum for those students, but I was trying to find out what sort of intuitions they have about that sort of representation,” she said.

“It turned out they are very capable of understanding those concepts.”

Traditionally, students are taught to focus on the construction of the graph, which can be very time-consuming. A program like TinkerPlots allows students to see the dynamic creation of graphs, as well as interact with the data and quickly make changes – it helps them make sense of the data.

“It frees them up to think about what story can be told from the graph and what message can be seen in the data,” Ms Fitzallen said.

She added that from a teacher’s perspective, appreciating what TinkerPlots can bring to the learning experience is really important.

“We would like to see schools choose graphing software, whether it’s TinkerPlots or not, for the positive way it influences students’ learning,” she said.
Papua New Guinea (PNG) has a rapidly expanding population and an emerging middle class, including a growing expatriate community in the capital, Port Moresby. Food needs are increasing and the emerging middle class is demanding a more westernised diet (including temperate vegetables such as broccoli, beans and onions). This demand creates an opportunity for smallholders and villages to expand their income by broadening the range and supply of the higher-quality vegetables they grow, explained Associate Professor Colin Birch, from the Tasmanian Institute of Agriculture.

Assoc Prof Birch is leading a team of scientists that is developing new vegetable production and marketing systems in PNG.

“The project aims to improve the economic wellbeing of smallholders and participants in the value chain, and to improve the quality and reliability of the supply of vegetables for the consumer,” Assoc Prof Birch said.

“The project is designing production – and marketing – systems for PNG, and selecting temperate vegetables that will grow well in climates that vary from hot, humid coastal regions to seasonally cooler regions of the highlands.

“We have also had to take into account other issues such as the role of women and young people in vegetable production and marketing. Other challenges include rough roads and lack of availability of refrigerated transport to get the vegetables to market, and quality deterioration in open markets.”

The project has focused on inclusive research engaging PNG scientists and community members in producing and delivering high-quality vegetables.

“Field trials have been carried out in collaboration with a high school, cooperatives, Pacific Adventist University and the research farm of the National Agricultural Research Institute at Laloki,” Assoc Prof Birch said.

“We are also developing the capacity of PNG researchers by encouraging them to undertake the field and value chain research and to co-author published papers from the project.”

Ultimately, this project should improve the capacity of PNG institutions to undertake research, development and extension projects, improve availability of quality vegetables, and improve the economic wellbeing of smallholders, villages and other participants in the value chain.

This four-year project, funded by the Australian Centre for International Agricultural Research, features collaboration between UTAS, the University of Canberra and several institutions in Papua New Guinea: National Agricultural Research Institute; Fresh Produce Development Agency; Pacific Adventist University; Central Province Administration and Green Fresh Ltd.
The University of Tasmania needs to attract candidates with the talent, passion and desire to excel in graduate research. We are now offering Elite Research Scholarships to outstanding applicants, and any business or individual interested in supporting our growing international reputation for research excellence is invited to contribute to the program by providing $7,500 per annum as a silent or identified sponsor. Valued at $31,000 tax-free per annum, Elite Research Scholarships are offered in specific project areas to help keep the research passion alight. The university provides the base scholarship. Your contribution enables us to top this up to a competitive level to attract the best candidates. If you’re keen to tick the final two boxes, contact the Dean of Graduate Research on (03) 6226 7127.