PASTURES AND GRASSLANDS | A GLOBAL SNAPSHOT

Can they be sustainably managed ?

Pasture Plus
Pasture Foliar Fertiliser

INTRODUCTION

Pastures and grasslands, which cover more than 25% of the earth's land surface, are under pressure.

And the question as to whether they can be sustainably managed for the future is an important one for the world-wide agricultural industry.

It is generally accepted that pressure comes from two angles :

1. an increasing demand for meat and protein products - which places the current pastures and grasslands under enormous strain to remain productive

2. an increasing demand for crop-based products, which places the current areas of pasture and grassland under threat, as competition for their conversion from grazing to cropping lands intensifies

The status-quo therefore, of these two sources of food and economic wealth that underpins many global populations and cultures, is under intense scrutiny. The pressure to be more productive, whilst still maintaining fragile social and political systems is growing, and will become more and more necessary if this important aspect of agriculture is to be sustained.

global pastures under pressure
global food supply under threat

This **Special Report** gives an overview of the current global position with respect to the status of agricultural grazing lands in both their formal and informal structures, and an understanding of how they are used. The information contained is as follows :

DEFINITION OF PASTURE

Pastures are generally accepted as the fields and paddocks on farms and pastoral properties where animals graze and feed, or where sustaining animal food crops are grown, harvested and then stored. Whilst grasses are a common pasture, there are many other kinds of plants that livestock eat. Farmers and graziers will choose what the best plants are for their particular livestock business. Clover and legumes are often planted and native species are relied upon as well. Other factors such as climate, weather patterns and soil types will also determine the best pasture crop to use to provide a reliable and sustainable supply of food for animals.

Whilst the narrow dictionary sense of pasture references it as being *"enclosed or managed parcels of farmland grazing 'domesticated' animal stock such as cattle, horses, sheep and pigs, supported by more intensive agricultural practices such as seeding and use of fertilisers and irrigation"*, the broader dictionary sense references to it as also including rangelands *"or other unenclosed pastoral systems that are used by 'wild' or native animal stock populations such as goats, sheep, yak, buffalo and other ruminants for grazing and browsing, with native vegetation being the feed source that relies entirely on climate systems for its continued growth and is occasionally controlled through the burning of the land"*.

In either definition, pasture is vital. It is important land for growing, and sustaining an industry which supplies an essential supply of food (together with its by-products of dairy produce, hides, fats and manures) for populations all over the world.

DEFINITION OF GRASSLAND

Grasslands are generally accepted as being habitats of wild-plant communities that are considered either 'natural' or 'semi-natural'.

The dictionary definition of the word says simply *"farmland occupied chiefly by forage plants, especially grasses"*. Or further, *"an ecological community in which the characteristic plants are grasses"*.

The majority of grasslands in temperate climates are considered to be 'semi-natural'. This is because their plant communities, whilst being of natural vegetation are maintained by activities such as low-intensity, localised or nomadic farming practice that uses both grazing and cutting regimes to sustain their effectiveness. Grasslands may contain species of wild plants such as grasses, sedges, rushes and herbs, which in several parts of the world are under significant threat of losing the wild flora associated with them. Generally associated with the wild-plant diversity of these unimproved grasslands is a rich invertebrate fauna, as well as many birdlife species that all contribute to the ecological balance for these important tracts of land.

There are many different words for grassland environments around the world. These include savannah, plains, scrubland, shrubland, steppes, prairies, veldts, pampas and compos – all cultural or language-based expressions for the same environmental structure. Grasslands can also include rangelands or pasture land that is not considered appropriate for cropping.

70% of agricultural land use is for animal production or feed

Agriculturally improved grasslands, which dominate modern intensive agricultural landscapes, are usually poor in wild plant species due to the original diversity of plants having been overtaken by the introduction of cultivated plant varieties such as perennial ryegrass and white clover, or perhaps other invasive species inadvertently introduced from nearby cultivated land.

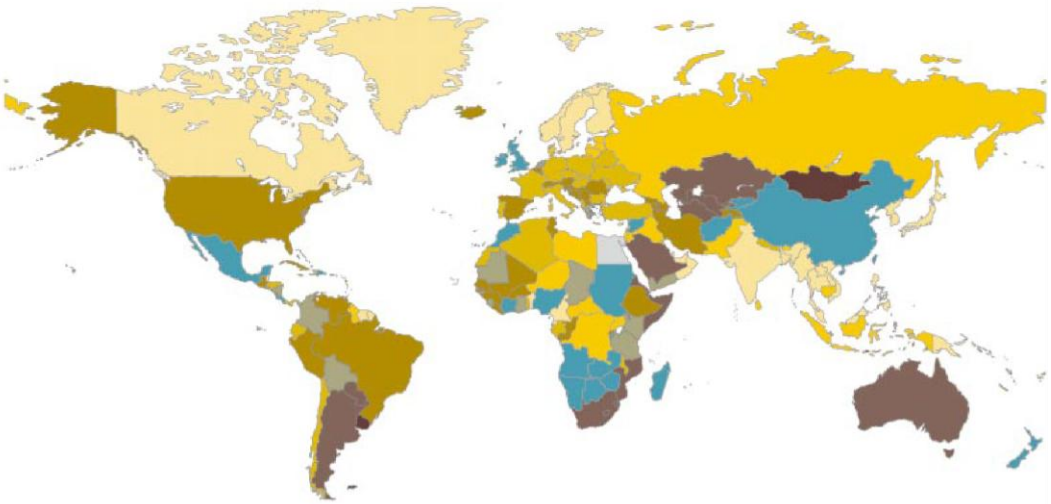
Grasslands too are of vital importance for raising livestock for human consumption.

SETTING THE GLOBAL SCENE

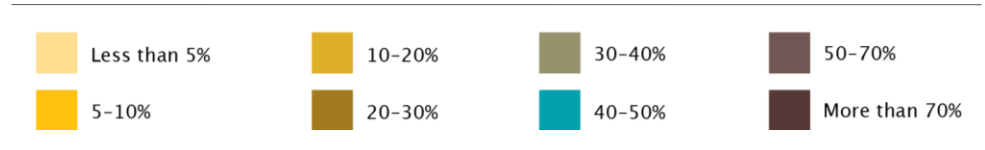
As a percentage of the world's agricultural and primary production businesses, livestock management and pasture crop production for animal feed is extensive.

It could well account for up to 70% of the world's agricultural land use.

Grazing, pasture and crop cultivation, fertiliser use and soil management along with other land management practices all support the major animal food production businesses that underpin both world trade and food security in the supply of meat protein, dairy products and primary production for wool and other textiles as well as other animal by-products.



Reference : AAAS Atlas of Population and Environment



The map of the world opposite shows the proportion of land use for pasture and grazing by percentage of each country's land area used permanently for forage.

The world's pasture and grazing lands have for the most part remained stationary for the past three centuries.

However, over the past three decades changes to grazing lands have been noted in several key global regions as follows :

- increases in the less densely populated regions of tropical Africa and Central/South America, often at the expense of forests that are being cleared to make way for cattle (and other ruminants) pastures
- declines of approximately 20% in Europe, South-East Asia and North America where increasing population has forced a switch from grazing to more intensive cropping and cultivation systems, including the feeding of livestock with grains such as corn
- increases in Asia and the Middle East, (notably China), increasing pasture lands at the expense of cropping environments

the struggle between crops and animals places pressure on pasture and grasslands

So, the struggle between these two vast and important agricultural systems intensifies and places continuing pressure on the animal-carrying pasture lands.

RISKS AND OPPORTUNITIES

Today it is estimated that at least 70% of the world's grazing land has deteriorated to such an extent that it has lost at least 25% of its animal carrying capacity.

The balance between the traditional or indigenous livestock cultures and the modern western-style grazing cultures is also at risk of becoming a destabilising factor in this struggle, therefore strong measures are needed to ensure this balance is maintained if food security is to be met and available to all.

Other risks for the continued success of animal production as a primary food source for the world are said to be :

- the destruction of soil fertility following the deforestation of land systems for grazing, forcing a cycle of abandonment of land and ongoing clearance in search of new pasture lands
- overgrazing by too many stock, for too long a period, leading to the natural vegetation being unable to recover

25% loss of capacity on animal carrying pastures means more productivity is required

- the process of degradation enabling weed infestation and infiltration of exotic species, giving inadequate and unsuitable food sources for herds and other animals

- encroachment by human populations onto former grazing lands

- the mass mobility of people currently being experienced in many parts of the world because of political unrest, placing pressure onto traditional methods of survival through the management of animals and grazing lands for food and culture

The message of maintaining a holistic approach to all agricultural sectors is a powerful one and every opportunity should be explored to help farmers and growers become more nurturing and more productive with the land already at hand.

Modern Day Farming Technologies

Modern-day farming technologies, practices, approaches and agricultural land management systems should all be viewed in this context. The importance therefore of managing the soil to ensure its animal-carrying capacity is retained to the optimum level of performance is critical to this debate.

RLF as a world-leading liquid fertiliser company has developed its product range specifically to meet this important objective.

RLF is at the forefront

RLF is at the forefront of several products and fertilising concepts that give great effectiveness to managed pasture lands, and these are as follows :

PASTURE PLUS

Pasture Plus is a crop-specific Ultra Foliar fertiliser spray with Nutrient Delivery System (NDS) that increases the efficiency in product uptake through the leaf by up to 350%. **Pasture Plus** delivers 12 essential nutrients contained in a High-analysis Broad-spectrum solution. These nutrients are formulated specifically for this crop type. **Pasture Plus** provides the plant with an optimum balance of essential nutrients to ensure soil nutrient variability and deficiency is fixed. **Pasture Plus** gives greater plant protection, more growth and improved yield qualities. This is done by using just one product that delivers 12 essential nutrients tailor made to suit the crop.

NUTRICOVER

NutriCover is a foliar-fertigation product formulated to satisfy the nutrient demand of plants at critical stages of plant growth for a fast and effective outcome. By using three forms of nitrogen, (urea, nitrate and ammonium), not just the one to stimulate metabolic pathways in the plant, **NutriCover** maximises the benefits of nitrogen through balanced crop nutrition. This means that **NutriCover** is at least three times more efficient than UREA nitrogen through the soil alone, thereby enabling a reduction in nitrogen by traditional granular fertiliser programs. **NutriCover** can be tailored with additional elements to suit specific nutrient requirements if the crop demands by using key major nutrients that function as activators and building blocks in plant growth.

NITROGEN PLUS

Nitrogen Plus is a foliar-fertigation product formulated to take care of the nitrogen demands of plants at the critical stages of plant growth. **Nitrogen Plus** contains the highest level of nitrogen in four different structures that a liquid formulation can hold. **Nitrogen Plus** utilises the RLF Nutrient Delivery System (NDS) technology that increases the efficiency in product uptake through the leaf by up to 350%. **Nitrogen Plus** gives fast entry nitrogen to protect against the nutrient deficiency and can be applied as a foliar to broadacre crops or in irrigation systems to all plants. The presence of four forms of nitrogen (*UREA, nitrate, ions, ammonium ions and organic nitrogen*), supports plant metabolism for fast and efficient uptake and utilisation of nitrogen.

POWERN

Power N is a high concentration source of liquid nitrogen specifically designed for safe foliar application and injection and is flexible and easy to use. **Power N** can be applied in targeted applications to meet crop demands at any growth stage. By being able to split applications throughout the growing season, growers can better manage crop risk. **Power N** is available as a bulk liquid, does not deteriorate and can be stored safely on-farm from year to year.

- **PowerN26** is a balanced ratio of nitrogen and sulphur.
- **PowerN39** is an efficient method of supplying nitrogen.

Power N products can be applied via irrigation or boomspray systems with flat fan or streaming nozzles, foliar sprayed, injected into the soil or sprayed on to the soil. **Power N** is ideal for 'little and often', or split applications to closely match crop nitrogen requirements and can be metered precisely for variable rates.

A STATISTICAL SNAPSHOT OF ANIMAL PASTURE PRODUCTION

At the beginning of this century the numbers of managed animal stock for the cattle, sheep and goat populations across the world were reported to be as shown in the following chart. Some 35 years earlier a similar census had been conducted, and the percentage growth or decline of these populations is indicated to better understand this movement.

Zone	Cattle		Sheep		Goats	
	Millions	% change	Millions	% change	Millions	% change
North America	111.5	-7	7.92	-71	1.43	-64
Latin America	351.55	88	87.83	-29	37.57	22
Europe	103.55	-10	138.27	6	14.98	14
Africa	223.34	72	240.34	76	205.64	109
Former USSR	62.28	-27	49.91	-63	5.81	3
Asia	449.64	39	378.68	55	443.78	106
Oceania	363.4	1293	165.72	-23	0.72	119
World Total	**1665.26**	**69**	**1068.69**	**5**	**709.93**	**93**

This world snapshot gives a clear sense of movement between three of the most widely farmed 'domesticated' herd stocks for animal food production. The most significant change reported was the dramatic increase in the numbers of goats being run. More recent figures appear to support this upwards movement for goats as a source of animal protein for meat and dairy foods.

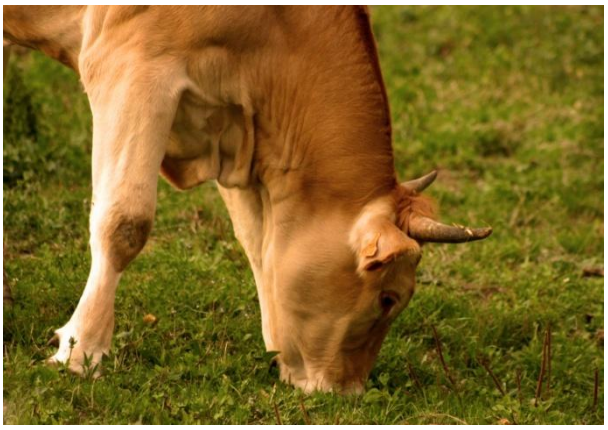
SETTING THE SCENE

A closer look at some of RLF's main markets, together with some of the emerging global marketplaces for animal pasture production within the region is provided as follows.

The statistics given provide an overview of the numbers of ruminant animals contributing to a range of animal production enterprises and the trends for the livestock industry in each of the countries.

In Australia

The information and figures were gathered as part of a formal survey of information on agricultural land management practices on Australian farms.*



The key findings were :

- Approximately 105,000 agricultural businesses (or 77% of all agricultural businesses) had livestock on their holding during the reference period. Of these businesses, 71% indicated that they held cattle and/or calves while 40% reported that they held sheep and/or lambs.
- Around 62,000 agricultural businesses reported rotating livestock on grazing land, with 21,000 (34%) of those in New South Wales and 17,000 (27%) in Victoria.
- Of the businesses breeding sheep in Australia, the lambing rate per 100 ewes was 98 for meat sheep and 90 for wool sheep.
- Of lambs produced, 97 meat lambs per 100 ewes were weaned, while the figure for wool lambs weaned was lower at 85 lambs per 100 ewes.
- The average age of lambs turned off was 13 months with an average weight of 40 kg.
- Tactical grazing of sheep and goats was the predominant rotation method, with approximately 21 million head rotated this way nationally, in 153,000 paddocks covering 14 million hectares.
- Of the businesses breeding cattle in Australia, the calving rate per 100 cows was 76 for meat cows and 79 for dairy cows.

- Approximately 6.5 million cattle were rotationally grazed across an estimated 504,000 paddocks, covering an area of 24.4 million hectares. Businesses in Victoria reported rotation practices for around 2 million cattle, or 30% of the national figure, across 208,000 paddocks (41% of all paddocks). Queensland businesses rotationally grazed around 1.7 million cattle or 26% of the national total, across 10.8 million hectares, or 45% of Australia's grazing area where rotation practices were conducted.

- Set-stocking for cattle was undertaken on approximately 35.3 million hectares in Australia. Queensland accounted for 15.5 million hectares of this total (or 44%) while the Northern Territory accounted for 8.2 million hectares (or 23% of the total).

** RLF acknowledges the data collected in the 2011-12 Land Management Practices Survey conducted by the Australian Bureau of Statistics.*

Western Australia's figures, not quoted in the above survey, add to the Australian story* :

- the estimated the gross value of beef production in Western Australia at $517 million.

- the export of some 220,000 live cattle valued at $154 million in addition to 99,000 tonnes of boxed beef products worth $68 million in 2012.

- the dairy industry whilst small has some 160 dairy farms producing about 350 million litres of milk each year. But despite its relatively small size, WA's dairy industry is reputed for its innovation and high quality products and will seek to double its milk production by 2025 to supply the increasing demand of Asian markets for high quality dairy products.

- the sheep industry contributes wool, sheepmeat (lamb and mutton) and live sheep. At around 14.2 million sheep, WA flocks turns off approximately 5.7 million sheep and lambs for meat and live export as well as 72 million kilograms of greasy wool (primarily for export markets) annually.

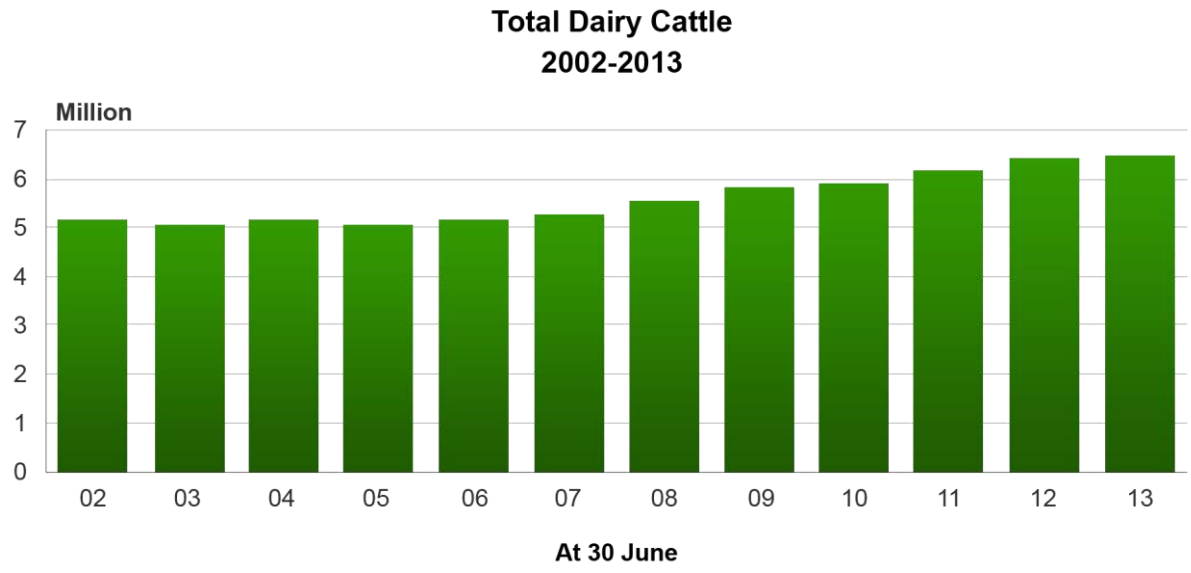
** RLF acknowledges the data collected in 2011-12 by the Australian Bureau of Statistics and made available courtesy of Department of Agriculture and Food WA.*

In New Zealand

In 2012 the following key statistics were determined as part of the annual survey of the agricultural industry animal production businesses on NZ farms.*

- dairy cattle numbered nearly 6.5 million – 1% more than the previous year
- sheep numbered 30.8 million – down 476,000 from the previous year
- beef cattle numbered 3.7 million – down 36,000 from the previous year
- deer numbers decreased by 3% to 1.0 million

The dairy industry continues to grow and the following chart maps this progress over a ten year period since 2002 :

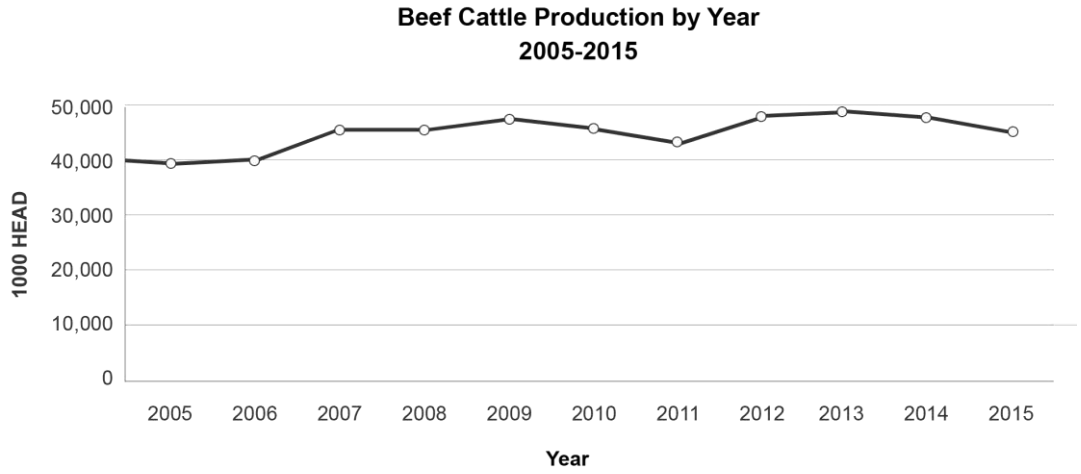


Source: Statistics New Zealand

** RLF acknowledges the data collected in the 2012 Survey of Farmers and Foresters conducted by Statistics New Zealand.*

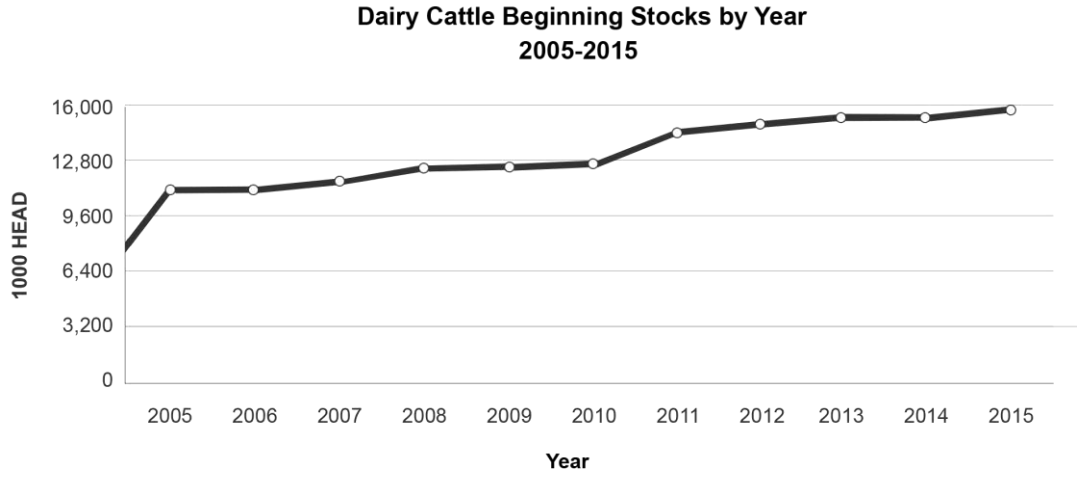
In China

- Beef cattle numbers are falling slightly as the following graph shows, however at 45.5 million head this represents a significant industry reliant on pasture.



Source: United States Department of Agriculture

- Dairy cattle number are increasing and at 15.3 million head represent the focus on supplying a reliable source of dairy products for the home market.



Source: United States Department of Agriculture

- Goat numbers are also on the increase with 196 million head being recorded in recent census.

- Buffalo are commonly accounted for in conjunction with beef cattle, and healthy populations of horses, donkeys and mules (combined total of approximately 20 million) are also still managed and used as part of China's pastoral systems.

In other Regional Marketplaces

In 2005, FAO recorded the following statistics for ruminant numbers. These figures capture the combined total of livestock for both meat and milk production.

Country	Cattle	Buffalo	Goats	Sheep
Thailand	5,500,000	1,800,000	270,000	50,000
Sri Lanka	1,160,900	310,500	405,390	11,480
Pakistan	24,200,000	26,300,000	56,700,000	24,900,000
Indonesia	11,500,000	2,400,000	13,200,000	8,300,000
India	185,000,000	98,000,000	120,000,000	62,500,000
The Philippines	2,600,000	3,300,000	6,500,000	0
Malaysia	755,000	130,000	225,000	119,000
Vietnam	5,250,000	2,950,000	1,200,000 (combined)	

Across the Americas

A glimpse of wider global perspective shows animal production and grazing numbers from across Northern and Latin America as follows :

- In the **United States of America** ruminant livestock production is a major segment of their agricultural industries. Income from beef cattle and calves, milk products, sheep, and goats totalled about US$93.7bn in 2007, compared to US$77.2bn income from grain crops. This shows the extent to which grazing is reflected in the country's land use. In 2007 there were 373m hectares in farming enterprises, of which 165m hectares were in permanent pasture and rangeland (44%), 14.5m hectares of cropland used only for pasture (4%), 12m hectares in pastured woodland (3%) as opposed to 164m hectares in cultivated crops (44%) with the balance being assigned to other forms of agriculture such as horticulture.

- In **Canada** pastures and grasslands occupy 44% of the total farmed area. In 2009 these areas were recorded as 15.5m hectares of natural forage land on private holdings, 5.7m hectares of seeded pastures, 2.9m hectares in sown hay and fodder crops and 5.1m hectares in alfalfa for both hay and pellets. In addition there are vast areas of natural rangelands. The total estimated value of forages used domestically exceeds US$1bn annually. Canada has an estimated 4.3 million beef cattle with the majority of these businesses being situated in the western provinces, with British Columbia being the largest.

- In **Argentina** in 2005, there were 50.8m head of cattle, 12.5m head of sheep, 4.2m goats and 3.7m horses. In recent decades sheep numbers have declined considerably, whilst horse livestock increased dramatically.

- In **Brazil** the predominant grazing production system relies on both native and cultivated pastures, which are stocked and grazed all year round. In 2004 there were 192m head of cattle, with three-quarters of these being for beef. There were 14.2m head of sheep, 1.2m buffalo and 9.1m goats. (Goats had increased dramatically on previous years). In addition there were 5.9m horses. Forage conservation is generally only managed for intensive dairy production systems and some rare feed-lot systems.

CONCLUSION

Animal livestock provide meat, dairy products, hides, tallow and other life-sustaining products.

Unquestionably animal production is an imperative for the continued food security of the world's populations. As an agricultural sector it underpins the economic survival of many marketplaces across the world. It generally outranks the agricultural production systems for crops as a human food source.

Livestock are also the main source of fertiliser for millions of hectares of cropland, particularly in developing countries and smaller rural economies, although it should also be noted that even in developed countries large areas of land unsuitable for cultivation continue to be grazed with little or no chemical fertiliser inputs.

Animal stock can improve or contribute to biodiversity, soil and vegetation cover, through their removal and control of 'bush growth' that triggers fires and also by dispersing seeds on their hooves and in their manures.

Manure from livestock is vital to land fertility for both agriculturally managed and natural systems, i.e. both pastures and grasslands. Through the cycle of digestion, ruminants collect and concentrate nutrients and convert them into manure which in turn fertilises the soil whilst helping maintain soil structure. This recycling of nutrients, in traditional farming systems in particular, is essential to the continued existence of cropping environments, thereby helping to sustain the other important primary food sector.

Animal production and crop production are therefore entwined and dependent upon the health and success of the other.

And, this is the important balance that needs to be maintained if food security for the world is to be achieved.

Demand for meat however has outstripped available pastures, with the result that more and more livestock are fed on fodder crops. This is a global trend, but applies most especially to the most densely populated countries. The shortage of pasture land has also helped change the kind of livestock being raised. Decreases are being recorded in cattle numbers in many regions, whilst goats worldwide have had an explosive increase in numbers. Pigs (now considered to be the world's largest meat source), and poultry, have experienced growth because they can be fed from feed-lots and more intensely farmed.

farming for food crops and animal production must remain balanced as the health and success of each is entwined

This is a complex, often complicated and evolving discussion, however at the heart of it all remains the soil.

So, can pastures and grasslands be sustainably managed for the future ?

The way in which all sectors of the world agricultural industry combine to ensure the very best advantage is made from the land systems currently under cultivation for both animal pastures and grazing, as well as for food production from crops and other market produce, will be the key to answering this question.

At RLF we research, develop, trial and market sustainable products that contribute much to performance and quality of crops and produce, and much to the building of soil organic matter.

We are committed to the role that we play in meeting the challenges of food production for the world, whether it be from animal production, animal feed production, broadacre cropping environments or small-scale market produce enterprises.

World-Leading RLF Product

WHAT RLF OFFERS

RLF's focus on high performance in liquid fertiliser formulations is recognised world-wide. Considerable technical expertise and analysis has been applied to bring new and exciting product categories to the market, all giving a new approach with a strategy that supports sustainable pasture systems.

SEED LEAF SOIL

RLF calls this the modern farming approach, and central to this is the fully Integrated Fertiliser Management (IFM) process that sees the correct balance and blend of chemicals via Soil, Seed and Leaf.

The health and continued sustainable use of pastures and grasslands will rely heavily on modern farming methods for the future, and a willingness for farmers and growers to embrace the changes that are needed.

The results experienced by many RLF customers are testament to this. The following links give insight into many of these experiences and the trial and evaluation data speaks loud and clear.

THE ASCENDENCY OF PASTURE PLUS IN 2014

RLF's 'grazing game-changer' !

TRIAL DATA AND EVALUATIONS FOR RLF PASTURE PLUS

NEW ENGLAND REGION
(Northern) NSW AUSTRALIA

MORE THAN A DECADE OF RESEARCH RESULTS FOR IFM

An RLF retrospective of Trial Data supporting Integrated Fertiliser Management

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