AgriFutures Buffalo Program
Strategic RD&E Plan
(2021-2025)

February 2021

by Neil MacDonald and Barry Lemcke with Louise Bilato, Bryan Jans and Mila Bristow
AgriFutures Buffalo Program Strategic RD&E Plan (2021-2025)

The information contained in this publication is intended for general use to assist public knowledge and discussion and to help improve the development of sustainable regions. You must not rely on any information contained in this publication without taking specialist advice relevant to your particular circumstances. While reasonable care has been taken in preparing this publication to ensure that information is true and correct, the Commonwealth of Australia gives no assurance as to the accuracy of any information in this publication.

The Commonwealth of Australia, AgriFutures Australia, the authors or contributors expressly disclaim, to the maximum extent permitted by law, all responsibility and liability to any person, arising directly or indirectly from any act or omission, or for any consequences of any such act or omission, made in reliance on the contents of this publication, whether or not caused by any negligence on the part of the Commonwealth of Australia, AgriFutures Australia, the authors or contributors.

The Commonwealth of Australia does not necessarily endorse the views in this publication. This publication is copyright. Apart from any use as permitted under the Copyright Act 1968, all other rights are reserved. However, wide dissemination is encouraged. Requests and inquiries concerning reproduction and rights should be addressed to AgriFutures Australia Communications Team on 02 6923 6900.

In submitting this report, the researcher has agreed to AgriFutures Australia publishing this material in its edited form.

AgriFutures Australia contact details
Building 007, Tooma Way
Charles Sturt University
Locked Bag 588
Wagga Wagga NSW 2650
02 6923 6900
info@agrifutures.com.au
www.agrifutures.com.au

Publication No. 21-004
Project No. PRJ-012908

Electronically published by AgriFutures Australia at

AgriFutures Australia is the trading name for Rural Industries Research & Development Corporation (RIRDC), a statutory authority of the Federal Government established by the Primary Industries Research and Development Act 1989.

Thank you to the Northern Territory Buffalo Industry Council for supplying the images used throughout this document.
“AgriFutures Australia fosters strong relationships with industry partners, including the buffalo industry, to ensure RD&E investment leads to practical knowledge and innovation which can be adopted by industry members.”

Mr John Smith
General Manager, Research
AgriFutures Australia

Foreword

The AgriFutures Buffalo Program invests in research, development and extension (RD&E) to foster a sustainable, safe and more profitable Australian buffalo industry.

The buffalo industry is based on both the Northern Territory (NT) free-range industry and the dairy sector. There is enthusiasm that the pace of change is quickening in both parts of the industry.

- Live export numbers have been steadily building, and in 2020, passed 10,000 head for the first time.
- There is now a commercial abattoir in the NT, which is processing considerable numbers of buffalo.
- The Australian population of riverine buffalo, originally imported in small numbers in 1994-97, has now grown to an estimated 2,000 to 3,000 head, which removes one of the major impediments to growth of the buffalo dairy sector.

AgriFutures Australia’s Program Strategic RD&E Plans are a key part of implementing AgriFutures Australia’s broader RD&E strategies and are the basis on which investments are made on behalf of our levied industries. These Strategic RD&E Plans identify productivity and sustainability RD&E priorities and the planned outcomes for each industry. Each has an appropriate balance of productivity and sustainability RD&E priorities.

AgriFutures Australia’s vision is to grow the long-term prosperity of Australian rural industries. We have three priorities to grow profitability and sustainability in our levied industries:

- Engaging industry participants in determining RD&E priorities.
- Investing in innovation that assists levied industries to be more profitable.
- Delivering outcomes to maximise industry uptake and adoption.

AgriFutures Australia will continue to work with the buffalo industry to ensure the five-year research priorities meet industry needs and are informed by Government priorities. The adoption of RD&E outcomes is fundamental to success, and just as we have with the AgriFutures Buffalo Strategic RD&E Plan, AgriFutures Australia will work with industry and Government stakeholders to ensure the corporation invests in knowledge that is useful and adopted by end users.

The profitability, productivity and sustainability of rural industries is AgriFutures Australia’s core business, and the organisation works with its portfolio industries to invest in their priority RD&E needs. AgriFutures Australia fosters strong relationships with industry partners, including the buffalo industry, to ensure RD&E investment leads to practical knowledge and innovation which can be adopted by industry members.

In making its RD&E investments for new, developing and established industries, AgriFutures Australia takes a lifecycle approach. These investment decisions acknowledge the maturity and development of each of the industries within the AgriFutures Australia portfolio. Whilst managing a very diverse portfolio of new, developing and established small industry opportunities for Australia, the lifecycle approach assists AgriFutures Australia to make appropriate RD&E investments.

The AgriFutures Buffalo Program invests in research, development and extension (RD&E) to foster a sustainable, safe and more profitable Australian buffalo industry.

Mr John Smith
General Manager, Research
AgriFutures Australia
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td>5</td>
</tr>
<tr>
<td>Our vision</td>
<td>8</td>
</tr>
<tr>
<td>Executive summary</td>
<td>9</td>
</tr>
<tr>
<td><strong>Industry profile</strong></td>
<td>10</td>
</tr>
<tr>
<td>NT buffalo industry</td>
<td>10</td>
</tr>
<tr>
<td>Dairy buffalo industry</td>
<td>14</td>
</tr>
<tr>
<td><strong>Buffalo research</strong></td>
<td>18</td>
</tr>
<tr>
<td>Funding</td>
<td>18</td>
</tr>
<tr>
<td>Previous buffalo research Plans</td>
<td>18</td>
</tr>
<tr>
<td>Partnerships</td>
<td>19</td>
</tr>
<tr>
<td><strong>Industry consultation</strong></td>
<td>20</td>
</tr>
<tr>
<td>Outcome of consultation</td>
<td>20</td>
</tr>
<tr>
<td><strong>Buffalo Program Strategic RD&amp;E Plan 2021-2025</strong></td>
<td>22</td>
</tr>
<tr>
<td>Priority 1: Reduction of mortality in the live export chain</td>
<td>22</td>
</tr>
<tr>
<td>Priority 2: Free-range field processing equipment</td>
<td>24</td>
</tr>
<tr>
<td>Priority 3: Measurement of feed conversion efficiency</td>
<td>25</td>
</tr>
<tr>
<td>Priority 4: Ration formulation for efficient and profitable feeding of milking buffalo</td>
<td>26</td>
</tr>
<tr>
<td>Priority 5: Market insight study for improved buffalo products</td>
<td>27</td>
</tr>
<tr>
<td><strong>Buffalo plan implementation and governance</strong></td>
<td>28</td>
</tr>
<tr>
<td>Research program</td>
<td>30</td>
</tr>
<tr>
<td>References</td>
<td>32</td>
</tr>
</tbody>
</table>
Our vision
To grow the long term prosperity of Australian rural industries

1 People and Leadership
Goal: Support the people driving the future prosperity of Australian rural industries and regional communities by providing them with learning opportunities and experiences.
Priorities: Attracting capable people into careers in agriculture. Building the capability of future rural leaders.

2 National Challenges and Opportunities
Goal: To identify and nurture research and innovation opportunities that are synergistic across rural industries.

3 Growing Profitability
Goal: Enhance the profitability and sustainability of our levied rural industries. Regional communities and the broader Australian economy depend on profitable farms.
Priorities: Engaging industry participants in determining RD&E priorities. Investing in innovation that assists levied industries to be more profitable. Delivering outcomes to maximise industry uptake and adoption.

4 Emerging Industries
Goal: To support new and emerging rural industries.
Priorities: Supporting the early stage establishment of high potential rural industries.

5 Outcome
Industry participants are confident that their levy investment is delivering value.
High-potential emerging rural industries established.

Approach
Listening and influencing
Delivering results
Partnerships and collaborations
Performance culture
Efficient business practices

Values
Connected / Positive / Real / Future-thinking
Innovative / Quality / Approachable / Networked / Confident Professional / Commercially savvy

Purpose
Through research and development, increase knowledge and understanding that fosters innovation, adaptive and valuable rural industries.

Executive summary
The growth of the Australian buffalo industry in recent years has been steady but slow. By most measures, neither the Northern Territory (NT) free-range industry nor the dairy sector have met expectations.

There are, however, grounds for optimism that the pace of change is quickening in both parts of the industry.

• Live export numbers have been steadily building up, and in 2020, passed 10,000 head for the first time. The export market for buffalo is expected to remain strong for the next few years while cattle are in short supply. The NT industry is highly reliant on live export as their best paying and most reliable market.
• There is now a commercial abattoir in the NT, which is processing considerable numbers of buffalo. It was estimated at 7,000 in 2020 with an expectation that it will reach 10,000 in 2021.
• The Australian population of riverine buffalo, originally imported in small numbers in 1994-97, has now grown to an estimated 2,000 to 3,000. As a result, surplus riverine heifers are now available on the market, which removes one of the major impediments to growth of the dairy sector.

The growth of the Australian buffalo industry in recent years has been steady but slow. By most measures, neither the Northern Territory (NT) free-range industry nor the dairy sector have met expectations.

There are, however, grounds for optimism that the pace of change is quickening in both parts of the industry.

For this Strategic RD&E Plan, over 70 representatives of buffalo industry stakeholders were interviewed. There was widespread agreement that addressing this threat to the NT buffalo industry was the most urgent and important issue.

The other issue gaining support from the free-range industry was the need for better equipment for holding freshly caught buffalo securely and safely in the field. They could then be safely fitted with electronic National Livestock Identification Scheme (NLIS) tags with less risk to human health and animal welfare. NLIS tags are a legal requirement for all movements of buffalo outside their property of origin to enable accurate biosecurity tracing.

The buffalo dairy sector proposed three main opportunities to increase growth of the industry, milk production, and profitability. These strategies focused on measurement of feed conversion efficiency, improved and updated ration formulation to increase milk yield, and targeted market insight to broaden domestic and export commercial options.

There are, however, major risks. The most pressing is the threat to the live export trade, caused by high mortality of buffalo on export vessels. Although there is much anecdotal evidence, no rigorous study has been carried out on the reasons for the poor health and welfare in the live export supply chain, or improvement strategies that can be used.

2021-25
The Australian buffalo industry is divided into two distinct parts — the free-range buffalo industry of the Northern Territory (NT) and the dairy buffalo industry, which has operations in most states.

The NT industry is based on swamp buffalo, either in uncontrolled herds in Arnhem Land and other areas of Aboriginal land, or managed within big paddocks on extensive commercial stations mostly located close to the coast to the west of Darwin.

The uncontrolled herd makes up the majority of NT buffalo and are estimated to exceed 160,000 head in 2019 (Casanova 2019) and over 180,000 in 2020, compared with an estimated 10,000 head managed on commercial stations. The dairy industry is based on riverine buffalo run on an intensive or semi-intensive scale. It comprises 12 dairies and about 3,000 buffalo.

The NT buffalo industry

The NT has had a long history, with buffalo harvesting dating back to the 1880s when the initial trade was mainly in hides. Export of live buffalo and meat products began in the 1950s. Through the 1980s and early 1990s, the buffalo population declined sharply because of the Brucellosis and Tuberculosis Eradication Campaign (BTEC), when large numbers were put through abattoirs and exported, mainly to the European Common Market. A comprehensive history of the NT buffalo industry can be found in The Australian Water Buffalo Manual (Lemcke 2016).

In the 1980s, the NT Government researchers devised a set of standards that could reliably produce a tender buffalo carcase. This process was used for some years to produce a commercial product TenderBuff® that had a good market in Darwin until 2007 when the abattoir processing the buffalo closed (Lemcke 2012).

Over the last 20 years, the live export trade has gradually increased. Since 2017, the number exported has approached and now passed 10,000 head, with the main markets being Vietnam, Indonesia, Malaysia and Brunei. The live trade to Vietnam, which started in 2014, takes mainly slaughter-weight bulls, while Indonesia takes younger males up to 350 kg to be finished in feedlots. Malaysia takes slaughter-weight buffalo opportunistically. Small shipments of breeders are also sold regularly, mainly to East Malaysia. Export numbers from Darwin topped 10,000 in 2020 for the first time.

Prices for the export trade in 2020 were at their highest ever at around $2.00 per kg liveweight, but this was still only half the amount paid in the same markets for cattle. Cattle are seen as a simpler animal to export, to fatten in feedlots, and to market. However, cattle from north Australia are expensive because the producers’ plan to restock after years of drought has reduced the national cattle population to its lowest level for 20 years. If, as predicted, rainfall over the next few years is better, then cattle prices are expected to remain high, and demand for buffalo as a cheaper alternative will also remain high.

The live export trade is the most profitable outlet for buffalo producers at present, and there appears to be more demand from overseas markets than the NT industry can reliably supply. However, the death rate of buffalo on live export vessels is four times higher than that of cattle. If reportable incidents are not reduced, severe trade restrictions could be introduced, which would pose a major risk.

With no large-scale abattoir operating in the NT between 2001 and 2015, the lack of an outlet for female buffalo and others that did not meet live export specifications was a major issue. The Livingstone abattoir (Australian Agricultural Company), about 50 km south of Darwin, processed a small number of buffalo while it operated in 2015–18. In December 2019, the Central Agri Group upgraded and re-opened the Batchelor Meatworks (Rum Jungle Meat Exports), 100 km south of Darwin, and processed about 7,000 head of buffalo in 2020. Coupled with the 10,000 head going to live export, this represents a marked increase in turn-off compared to previous years.

The buffalo particularly favour flood plains, where local overpopulation causes significant damage to drainage channels and to crocodile and magpie goose nesting sites. This has led to demands from traditional owners that the buffalo population in these sensitive areas be reduced. The main intention has been to do this by harvesting, which provides local jobs and royalty payments to the traditional owners. This is carried out in the dry season by experienced contractors, using either modified catching vehicles or helicopter mustering into temporary yards.

In 2019, the buffalo population of Arnhem Land was estimated at 162,000, and growing at 27,000 per year (Casanova 2019). By 2020, the estimate was over 180,000. The buffalo particularly favour flood plains, where local overpopulation causes significant damage to drainage channels and to crocodile and magpie goose nesting sites. This has led to demands from traditional owners that the buffalo population in these sensitive areas be reduced. The main intention has been to do this by harvesting, which provides local jobs and royalty payments to the traditional owners. This is carried out in the dry season by experienced contractors, using either modified catching vehicles or helicopter mustering into temporary yards.
Buffalo supply chain from Arnhem Land, NT

Figure 1: Buffalo supply chain from Arnhem Land, NT

**Buffalo supply chain issues**

1. Slow and difficult process to get agreement from all traditional owners
2. Difficult to safely tag and dehorn wild buffalo in the field
3. Insufficient capacity of depots where young buffalo can grow under grazing
4. Buffalo have often not had sufficient time to adapt after capture
5. Shipping and quarantine diet is not specific for buffalo
6. High death rate on board

**Existing compliance in the supply chain**

- Section 19 Land Use Agreement with traditional owners, through Northern Territory Land Council
- Biosecurity and welfare regulations including National Livestock Identification System (NLIS)
- Biosecurity and welfare regulations including NLIS
- Meat safety regulations
- Quarantine regulations
- Export Supply Chain Assurance System (ESCAS)
- Federal live export regulations
Some dairy operations are vertically integrated niche businesses that sell their own meat and milk products locally, while the bigger ones sell to cheese factories.

Currently, cheese factories pay between $3.00 and $4.00 a litre for milk, compared with less than $0.50 for cow’s milk. Average herd daily milk yields appear to be 5-10 litres, depending on whether the buffalo are milked once or twice a day.

Their advantage in the cheesemaking business is that total solids content of the milk is twice that of dairy cattle, which leads to double the recovery rate of product from the milk. This somewhat lessens the milk-volume production differences between buffalo and cattle.

Because the NT riverine buffalo herd started with only four heifer and four bulls imported from the USA between 1994 and 1997, the build-up to the current numbers has taken over 20 years. Now, sufficient surplus heifers are being bred from current herds to be able to increase the number of dairy enterprises faster than was previously possible.

Purebred female breeder prices have been sustained at $3,500 to $5,000 per head, so there are more profitable returns per cow for the dairy producer than for the meat producer. For both, potential future sales appear to be positive.

The impact of the riverine importation on the productivity of the swamp buffalo for meat production through crossbreeding has been well reported (Lemcke 2012).

In the last 20 years, dairy buffalo breeders have been exported to New Zealand, Japan, China, Chile, Bahrain, Indonesia, Sabah, and South Africa from commercial and NT Government riverine herds.

### Table 1
Buffalo export numbers since 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Destination</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Brunei (625), Indonesia (4), Vietnam (4,468)</td>
<td>5,097</td>
</tr>
<tr>
<td>2016</td>
<td>Brunei (509), Vietnam (3,981), West Malaysia (1,212)</td>
<td>5,792</td>
</tr>
<tr>
<td>2017</td>
<td>Brunei (148), Indonesia (1,228), Sabah (125), Vietnam (4,008), West Malaysia (4,406)</td>
<td>9,916</td>
</tr>
<tr>
<td>2018</td>
<td>Brunei (417), Indonesia (3,724), Malaysia (1,465), Vietnam (3,007)</td>
<td>8,673</td>
</tr>
<tr>
<td>2019</td>
<td>Brunei (576), Indonesia (3,377), Malaysia (1,584), Vietnam (3,825)</td>
<td>9,384</td>
</tr>
<tr>
<td>2020</td>
<td>Brunei (221), Indonesia (6,252), Sarawak (386), Vietnam (3,994)</td>
<td>10,833</td>
</tr>
</tbody>
</table>

Thus, despite the strong market demand and a growing buffalo population, the full potential of the NT industry has not been realised. The NT Buffalo Industry Council and the NT Government have a long-term intention that the feral buffalo herds will be brought under control, but many problems must be solved before that can be attained.

### Dairy buffalo industry

Buffalo dairies operate in all states except WA and the NT, and there appears to some interest in starting dairy operations in both those jurisdictions as well. Of the 12 known dairy operations, two are in QLD, though one is currently not milking, three each in NSW, VIC and SA, and one in TAS. In December 2020, the two largest operators were milking 300 and 200, respectively, in VIC. It is estimated that in southern states, there are between 2,000 and 3,000 head of riverine origin. All dairies except one derived their stock from the NT Government Beatrice Hill Research Farm, located 65 km outside of Darwin. Initially, these commercial dairies bought riverine buffalo crossbred progeny, which they subsequently upgraded with high-quality imported Italian dairy semen. The exception is the current largest buffalo dairy in VIC, which imported their stock directly from Italy and Bulgaria, and have not distributed their genetics in Australia.

In southern Australia, droughts (2016-19) and bushfires (2019-20) caused major issues for buffalo farmers. The COVID-19 pandemic (2020) that followed sharply reduced demand from restaurants and high-end markets. Many dairy producers had no outlet for their milk and had to dispose of it. Subsequently, some cooperatively launched a media campaign to recover their markets. Production will take time to recover because many cows were dried off in response to the lack of demand.

Access to abattoir facilities in most states is tenuous. Many abattoirs are not prepared to slaughter buffalo, either because they are not familiar with them or have had a bad experience with some previously.
### Industry profile

#### Figure 2

**SWOT analysis of Australian buffalo industry**

<table>
<thead>
<tr>
<th></th>
<th>NT rangeland buffalo</th>
<th>Dairy buffalo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>Buffalo adapt to low-grade pastures of northern tropics better than cattle.</td>
<td>High-value products.</td>
</tr>
<tr>
<td></td>
<td>Large free-range population.</td>
<td>Demand for niche products.</td>
</tr>
<tr>
<td></td>
<td>Buffalo industry provides jobs and income for remote Aboriginal communities.</td>
<td>Availability of riverine stock from NT.</td>
</tr>
<tr>
<td></td>
<td>Buffalo need less inputs and intervention than cattle to maintain productivity.</td>
<td>Higher recovery rates for cheese than with dairy cow’s milk.</td>
</tr>
<tr>
<td></td>
<td>Higher zinc and iron, and lower cholesterol than beef.</td>
<td>Ability to be successfully milked once daily without detriment to animal wellbeing, thus improving farmers’ lifestyle.</td>
</tr>
</tbody>
</table>

| **Weaknesses**       | Lower price per kg than cattle.                                                      | Lower milk production than with cattle.            |
|                      | Buffalo reputation for tough meat.                                                   | Lack of industry scale.                            |
|                      | Harder and slower to handle through yards, and harder to slaughter than cattle.      | Only 12 buffalo dairies, and generally small-scale production. |
|                      | Time-consuming negotiations with Aboriginal traditional owners.                    | Shortage of workers with the skills to manage and handle buffalo appropriately. |
|                      | Industry has a reputation for ill-discipline.                                        | Southern abattoirs loath to take buffalo.           |
|                      | Supply chain from Arnhem Land not functioning well because of logistic and regulatory problems and lack of sufficient depot areas. | Limited supplies of high-quality meat animals to be able to supply potential demand. |

#### Opportunities

<table>
<thead>
<tr>
<th>NT rangeland buffalo</th>
<th>Dairy buffalo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export market believed to be capable of expansion if supply was secure.</td>
<td>Low numbers of suitable milking animals now less of a constraint on industry expansion than previously.</td>
</tr>
<tr>
<td>After several years, there is now an abattoir taking buffalo that cannot go to live export.</td>
<td>Potential for better returns for meat than currently offered.</td>
</tr>
<tr>
<td>High cattle price and low cattle supply to continue, providing demand for buffalo for some years.</td>
<td>Genetic selection not fully exploited.</td>
</tr>
<tr>
<td>Need to reduce local overpopulation can provide synergy between production and conservation.</td>
<td>Domestic and export market potential not fully explored.</td>
</tr>
<tr>
<td>Potential Indigenous-owned enterprises and jobs based on buffalo capture and domestication throughout Arnhem Land where buffalo are plentiful.</td>
<td>Potential market links with other dairy species (camel and goat).</td>
</tr>
</tbody>
</table>

#### Threats

<table>
<thead>
<tr>
<th>NT rangeland buffalo</th>
<th>Dairy buffalo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuing high mortality could close or restrict buffalo exports.</td>
<td>Industry based on a few individuals.</td>
</tr>
<tr>
<td>‘Social licence’ could be lost because of poor animal welfare practices.</td>
<td>Cheaper Italian frozen raw milk imports in large quantities making expansion of industry difficult.</td>
</tr>
<tr>
<td>Issues with Halal stunning of larger buffalo.</td>
<td></td>
</tr>
<tr>
<td>Abattoirs could close; thus lose the outlet for out-of-specification buffalo.</td>
<td></td>
</tr>
<tr>
<td>If musters fail to keep the buffalo population in check, conservation groups (responsible for land management) may revert to aerial culling.</td>
<td></td>
</tr>
</tbody>
</table>
The 2013-2018 Buffalo Plan was part of the AgriFutures Animal Industries Five Year RD&E Plan. The buffalo goals were:

1. To reinvigorate the live export program, with a focus on stunning procedures that complied with Exporter Supply Chain Assurance Systems (ESCAS) regulations and Halal slaughter.
2. Opportunities for local processing, including Halal.
3. Compilation of specific information for buffalo management (meat and milk).
4. Distribution of milk composition information for the industry and general public.
5. Monitoring genetic improvement in buffalo dairying.

In response to those two plans and earlier work, the following projects have been completed, with reports available on the AgriFutures website:

1. Increasing buffalo production using reproductive technology (Tatham 2000).
2. Maximising market opportunities for buffalo products (Leach 2001): focused on buffalo meat.
3. Composition of new meats (Beilken et al. 2007).
4. Genetic and reproduction improvements (Lemcke 2008): artificial insemination (AI) and creation of a genetic database.
5. Enhancing productivity improvements (Lemcke 2012): more information on AI and testing of TenderBuff®.

Partnerships

The AgriFutures Australia Buffalo Program is ready to partner with other agencies and commercial companies with an interest in similar outcomes. In many cases, buffalo research is linked to broad concepts that many other agencies are concerned with, such as animal welfare, live export, north Australian development, and Aboriginal economic advancement.
Industry consultation

Over 70 individuals representing stakeholders in the Australian buffalo industry were contacted between 10 November and 10 December 2020. Most were interviewed by telephone, some discussions were in person, and some replies were emailed. Questions were related to the nature of their business, and opportunities and risks that they identified affecting either their own business or the buffalo industry as a whole.

The individuals contacted were classified into the following categories:

- Government representatives – 11
- Industry organisations – 11
- Research organisations – 5
- Indigenous organisations – 4
- Exporters – 9
- NT buffalo producers – 13
- Dairy processors -11
- Meat processors – 3

Outcome of consultation

All the parties contacted were prepared to discuss their business in an open and frank manner, and provided valuable input into the RD&E Plan.

The issue that most respondents said was the most important and urgent was the need to safeguard the live export trade by reducing on-board buffalo mortality. The need for well-researched data on the causes of poor buffalo health and welfare in the export supply chain was strongly supported by exporters, agencies and all other stakeholders concerned with the NT free-range industry. Two other subsidiary issues – uncertainty over the efficacy of pneumonia vaccination, and the lack of specific buffalo-pelleted live export feed – were also well supported, and have been included in Priority 1 of this Plan.

The other issue that received strong support from NT stakeholders was the development of better equipment to secure freshly caught buffalo, thus enabling NLIS tags to be safely fitted in the field in accordance with biosecurity regulations.

Other issues proposed by the NT free-range stakeholders included Aboriginal economic development and training, integrated land use and economics of alternative land use strategies, and training in low-stress handling. These issues will be considered in partnership with other agencies involved in north Australian and Aboriginal economic development.

The dairy sector identified opportunities for improved production and industry growth. The three top-ranked were measurement of feed conversion efficiency, updated ration formulation to improve milk yield and profitability, and targeted insights into domestic and overseas markets. These have been included as research priorities in this Strategic RD&E Plan.

Other proposed research concepts included new product development to provide a longer shelf life and product diversification, efficient strategies for producing weight gain and better meat quality in females, and advanced reproductive techniques, such as ambient temperature sperm storage. These issues are common to other livestock species and should be considered for application in the buffalo industry after consideration of that research.

There was also interest in the parameters of milk quality for optimal production of mozzarella, which is an issue in common with the large European market, and therefore initially requires an examination of international literature.
Buffalo Program Strategic RD&E Plan 2021-2025

1. Priority - Reduction of mortality in the live export chain

Objective

To reduce high mortality and improve health and welfare of buffalo within the live export supply chain.

Justification

Since 2015, the mortality rate of buffalo on board live export vessels has averaged 0.43%, compared to 0.11% in cattle. Because of the great importance the Australian public places on animal welfare in the live export industry, a notifiable level of mortality per voyage for each species is set under the Australian Standards for Export of Livestock (ASEL 3.0, Department of Agriculture 2008). For buffalo, this is generally 0.5% over the course of a single voyage. Exceeding this level triggers a federal government investigation and potentially serious commercial consequences. Between 2018 and 2020, there have been eight reportable incidents on buffalo shipments, which makes the risk of a buffalo shipment reaching the reportable level eight times that of cattle. If uncorrected, this mortality rate could have profound implications for the future of buffalo exports and possibly also for the cattle trade. Great concern has been expressed by exporters, by agencies concerned with the live export trade, and by buffalo producers who rely on the live export as their most lucrative market. However, there is little or no hard data, only anecdotal evidence, on the causes of this mortality, and on underlying factors causing poor health and welfare outcomes for buffalo in the supply chain. Related factors that may contribute to the high mortality rate are the lack of a specifically designed shipboard diet for buffalo, and lack of information on the application and efficacy of pneumonia vaccination.

Timing

• The majority of stakeholders considered this issue to be urgent. Research into this issue would need to fit in with the peak harvesting period of free-range buffalo for export from Darwin, which is from June to October, the mid to late dry season when roads are accessible.
• The research phase is expected to take two years, and full commercial adoption a further 2-3 years.

Strategies

• Identify risk factors that may lead to adverse health and welfare outcomes for buffalo along the export supply chain.
• Investigate the relationship between measured health and welfare parameters in buffalo in quarantine facilities and aboard live export vessels, and a range of environmental and management variables recorded throughout the preceding supply chain.
• Investigate the efficacy of vaccinating export buffalo against pneumonia.
• Develop pelleted feed specifically designed for buffalo as a diet on board live export vessels and in export yards.

Impacts and consequences

By the end of the Plan period (2025)
• Buffalo mortality on live export vessels will reduce from 0.43% towards a target similar to the mortality rate of cattle (0.11%).
• The risk of buffalo shipments exceeding the ‘reportable incident’ mortality threshold of 0.5%, and thus incurring regulatory repercussions, will be reduced to a level similar to cattle shipments.
• The risk of buffalo export losing its social licence from unacceptable animal welfare incidents will be reduced.
• Buffalo will adapt quickly to a specifically designed diet, and lose less weight in quarantine and on live export vessels.

By the end of the two-year research phase
• Reliable data that could be used to review the ASEL regulations will be available.
• A clear set of recommendations on vaccination against pneumonia will be available to exporters.

Economic implications

If the buffalo mortality rate on board live export ships was to reduce from 0.43% to the same rate as cattle (0.11%), there would be 128 buffalo deaths averted each year. These would be expected to be predominantly bigger buffalo with a total value of about $192,000 per year.

However, the main benefit of better buffalo health and welfare in the live export chain would be less risk of more regulation that could be imposed if mortality continues to be high. If, for example, continued mortality led to the suspension of shipping slaughter-weight buffaloes, then up to 4,000 head would have to be processed in a domestic abattoir rather than exported. The difference in price would mean an annual loss of revenue to the industry of $0.96m.

The full implications of a potential loss of buffalo live export are yet more complicated. Without the higher value export trade, it would be difficult for harvesting operations in the remote areas of Arnhem Land to be profitable. It is likely that increased aerial culling would be needed to control numbers in sensitive areas, which would be a major expense and would yield no commercial products and no royalties for the traditional owners.

Source of measurement data and responsibilities

• Data collected by LiveCorp’s LIVEXCollect system will demonstrate a measurable improvement in health and welfare parameters for buffalo.
• Department of Agriculture reports tabled in Parliament will demonstrate lower mortality rates of buffalo on board live export vessels.
• ASEL regulators will have access to reliable scientific data on the factors causing poor health and welfare of buffalo, and the strategies that the industry can use to address this.
• Exporters will report improved weight gain in quarantine yards and on board ship.

Indicative share of RD&E Budget:

60%
Buffalo Program Strategic RD&E Plan 2021-2025

2 Priority - Free-range field processing equipment

Objective
To build a prototype, and devise a pathway to commercialisation for equipment that will allow newly harvested wild buffalo to be safely ear-tagged and dehorned in the field without a permanent yard, and with emphasis on welfare of the animals and safety of the operators.

Justification
- Buffalo in Arnhem Land and surrounding areas are essentially wild. They are either mustered by helicopter into temporary yards or are caught with mechanical arms on the side of specially modified catching vehicles.
- Biosecurity regulations require livestock to be fitted with NLIS tags before leaving their property of origin, as identified with a Property Identification Code (PIC). This policy even applies to freshly caught feral buffalo in remote parts of Arnhem Land where there are no permanent yards and few fences. Tagging buffalo, and often trimming horns at the same time, in temporary facilities where the animal is not held securely is dangerous for the musterers and stressful for the buffalo.

Timing
- The main buffalo mustering period in remote areas of the NT tropics is the mid to late dry season (June to October). The main period when harvest contractors would be available to hold a workshop to discuss designs would be the wet season (January to April).
- The initial research and design phase is expected to take one year, evaluation and commercialisation another year, and full adoption a further two years.

Strategies
- In collaboration with NT harvest contractors, assess the requirements of equipment that would securely and safely hold newly harvested free-range buffalo and allow them to be ear-tagged, dehorned and loaded on a truck.
- Review existing equipment to seek a suitable base for a better model.
- Manufacture and test a prototype based on the identified requirements.
- Propose a pathway to commercialisation.

Impacts and consequences
By the end of the Plan period (2025)
- Buffalo will be tagged (NLIS) at the point of muster and, thus, satisfy biosecurity movement regulations.
- Buffalo horns will be cut to the required length before trucking, thus reducing the chance of causing damage to other animals while being transported.
- Poor animal welfare and poor worker safety will be minimised.

Source of measurement data and responsibilities
- Cost-effective equipment has been designed, tested, and made available for sale to buffalo contractors mustering free-range buffalo in remote areas.
- NT Government biosecurity authorities will use NLIS data to confirm that buffalo are safely tagged before leaving the property (via PICs) on which they are mustered.

Indicative share of RD&E Budget: 8%

3 Priority - Measurement of feed conversion efficiency

Objective
To measure feed conversion efficiency and growth rates in different types of buffalo.

Justification
It is known that under certain conditions buffalo grow faster than cattle, but it is not clear whether this is because they use the feed more efficiently or just that they eat more. Previous feeding trials in the NT pre-dated the introduction of the faster growing riverine breed and the riverine-swamp crossbreds, and they did not investigate feed conversion efficiency. Similarly, there has been no testing of enteric methane produced by buffalo in the Australian environment. This may vary from that of cattle because of the buffalo's ability to process lower quality roughages.

Strategies
- Undertake scientifically valid replicated trials under controlled conditions to measure growth rates and feed conversion rates in yearling riverine, swamp and crossbred buffalo, and compare them with Brahman cattle under two different diets.
- Test greenhouse gas emissions from buffalo emissions under similar conditions.

Timing
- This research project, including planning, pen trials, and scientific reporting, should be completed in 18 months.

Impact and consequences
By the end of the Plan period (2025)
- Published peer-reviewed research will show clear results of feed conversion efficiency and greenhouse gas emissions from stall-fed buffalo.
- If it is shown that buffalo are more efficient than cattle, this should result in more interest in buffalo as a meat animal, and encourage growth of this part of the buffalo industry.

Source of measurement data and responsibilities
- Interest in buffalo meat can be monitored from the throughput and price offered by abattoirs. The impact of this research is expected to be gradual and long term, so abattoir data should be collected biennially (every two years) by the Australian Buffalo Industry Council.

Indicative share of RD&E Budget: 12%
### 4. Priority - Ration formulation for feeding of milking buffalo

**Objective**

To improve knowledge of optimum diets for intensive feeding of dairy buffalo.

**Justification**

- Nutrition is the main factor in intensive animal production systems.
- Because buffalo dairy is relatively new, knowledge of buffalo nutrition does not match that of dairy cattle.
- Buffalo dairy attracts premium prices per litre, but milk yield is lower. If yield could be raised, buffalo dairy would become a much more profitable enterprise.

**Strategies**

- Devise nutritional strategies that will enable commercial buffalo dairies to achieve an average of 10 L per buffalo per day.

**Impacts and consequences**

- Dairies will become more profitable.
- Buffalo dairy will be an attractive option for other dairy farmers.
- Higher production will open the industry to more market options.

**Source of measurement data and responsibilities**

By the end of the Plan period (2025)
- The Australian Buffalo Industry Council will report on adoption of the updated ration recommendations.
- Production from a sample of cooperating dairies will demonstrate an increase in milk production (L/day/head).

**Indicative share of RD&E Budget:**

10%

### 5. Priority - Market insight study for improved buffalo products

**Objective**

To produce updated insights into new domestic and overseas markets for a wide range of buffalo products.

**Justification**

- Buffalo dairy is a fairly new industry, and the full range of market possibilities has not been adequately explored. Most information is anecdotal.
- In particular, possible high-value markets in SE Asia have not been investigated.
- Improvements in production or growth of the buffalo dairy industry should be planned in conjunction with an enlarged market to ensure that existing dairies are not disadvantaged.
- Camel and goat dairies face similar issues to buffalo dairy, so it may be advantageous to use a common marketing outlet and strategy, particularly when trying to break into the SE Asian high-value market.
- There are ethnic groups in Australia with traditional links to buffalo milk and meat products. No investigation of their specific preferences has yet been carried out.

**Strategies**

- Review the range of buffalo milk products to look for other possibilities.
- Investigate the preferences of ethnic groups in Australia that have traditional cultural links to buffalo.
- Investigate the potential for a combined market strategy into SE Asia with camel and goat milk products.

**Impacts and consequences**

- A marketing strategy tailored to specific groups in Australia with a preference for buffalo products will be carried out.
- Dairy producers will be able to identify possible overseas commercial opportunities.
- Additional markets will provide opportunities for the buffalo industry to grow without disadvantaging existing producers.
- A combined marketing strategy with camel and goat milk may offer better brand recognition while sharing costs between the three industries.

**Source of measurement data and responsibilities**

By the end of the Plan period (2025)
- The preferences for buffalo products of different ethnic groups in Australia will be identified and incorporated into a tailored marketing strategy.
- The goat and camel industries will agree to join the buffalo industry in a joint export market strategy, with an equitable model for cost-sharing.
- An export marketing strategy, including price points and potential commercial contacts, will be completed.

**Indicative share of RD&E Budget:**

10%
Buffalo plan implementation and governance

It will be critically important that the Australian Buffalo industry has representation with AgriFutures Australia in the implementation of this Plan and the oversight of its performance. A relatively simple governance arrangement should be established.

The research subcommittee formed from Northern Territory Buffalo Industry Council (NTBIC) and Australian Buffalo Industry Council (ABIC), with other membership from the NT Government will be invited to work directly with AgriFutures Australia. More invitations can be offered per project to representatives of other organisations with a shared interest in the area of research.

AgriFutures Australia will also be a member of this subcommittee, as well as providing an internal staff resource for administration purposes.

Appointments will have a tenure of three years. Most meetings would be by teleconference (or using other technologies), with a face-to-face meeting available if required.

In the case of the latter, AgriFutures Australia would cover member travel and associated expenses.
Research program

AgriFutures Buffalo Program Strategic RD&E Plan (2021-2025)

### Strategies

1. Identify risk factors leading to adverse health and welfare outcomes.
2. Investigate relationship between health and welfare parameters in quarantine and on board vessels, and management and environmental variables earlier in the supply chain.
3. Investigate efficacy of vaccination against pneumonia.
4. Develop pelleted diet for export, specifically designed for buffalo.
5. On-board mortality to reduce from 0.43% towards cattle mortality of 0.11%.
6. ‘Reportable incidents’ on live export buffalo shipments to reduce to level of cattle shipments.
7. Risk of buffalo export losing its social licence reduced.
8. Reliable data used to review ASEL regulations.
9. Clear recommendations on vaccination available for exporters.
10. In export yards, buffalo adapt quickly to specially designed pelleted feed and lose less weight.

### Impacts & consequences

- Objective one: To reduce mortality and improve health and welfare in the live export supply chain.
- Objective two: To develop equipment to enable newly captured buffalo to be safely tagged.
- Objective three: To measure growth rates and feed conversion efficiency.
- Objective four: To improve knowledge of optimal diets for intensive feeding of dairy buffalo.
- Objective five: To produce updated insights into domestic and overseas markets for wide range of buffalo products.

### Budget

- Objective one: 60%
- Objective two: 8%
- Objective three: 12%
- Objective four: 10%
- Objective five: 10%
References


