Department of
Primary Industries and
Regional Development

GOVERNMENT OF
WESTERN AUSTRALIA

Exclusion fence design and construction Investigation trip - Longreach, Queensland

Attendees: Craig Robins, State Barrier Fence (SBF) Manager and Paul Clune, SBF Supervisor

Dates: 30 July to 3 August 2018

Purpose:

- To investigate innovative fence construction techniques being used in Queensland that could potentially reduce fence material and construction costs on similar fencing projects in Western Australia.
- To receive training in the use of a fencing machine owned by Australian Wool Innovation Inc. (AWI)

Background:

Under the WA Wild Dog Action Plan 2016-21, the State Government is investing $4.8 million in repairing and replacing old sections of the SBF and $6.9 million to the construction of 660km of new SBF in the Shires of Ravensthorpe and Esperance. The State and Federal Governments are also supporting four cell fencing projects in the WA rangelands.

The significant investment in fencing infrastructure projects prompted Department of Primary Industries and Regional Development (DPIRD) staff to investigate fence design and construction changes in Queensland, where thousands of kilometres of wild dog exclusion fences are under construction.

DPIRD and Australian Wool Innovation (AWI) co-funded two DPIRD staff to travel to Longreach, Queensland to be trained in an AWI fencing machine that has the ability to tension/strain 500m sections of fence, as opposed to the 300m sections currently strained on the SBF. Additionally to inspect the latest wild dog cell fencing operations. Longreach was chosen given AWI's fencing machine was in operation by contractors at the time and because up to 1700km of cell (cluster) fencing is being installed in the region.

Longreach Wild Dog Exclusion Fence highlights

Funding

The Longreach Regional Council submitted a business case to the Queensland Government on behalf of landholders in their local government area. A one-off loan was obtained from Queensland Treasury Corporation.

Landholders committed to building up to 1700kms of property boundary dog fencing at a cost of $12.7 million in total with a two year completion date. The 63 ratepayers involved in the project will pay for the fencing loan through a special rate levied over a period of 20 years.

Governance

Longreach Regional Council is the fund manager and the initiative is cost-neutral to the Council. The Council manages a panel list of various materials suppliers and construction contractors as well as the procurement of materials and contractors.

Landholders apply to the Council for funding of their boundary fences. Each landholder measures the length of boundary fence they require, orders the materials they need for their individual property through the Council and has them delivered to site.

Either the landholders construct the fence themselves or they can engage a contractor from the list of contractors provided by the Council.

Generally landholders clear the old fence line and contractors construct the new fences.

Construction costs

To date the cost of materials and construction of any of the Longreach fences has been no higher than **$7500 per kilometre**. Contract construction costs are between $2500 and $3000 per kilometre with the balance being fence material costs.

Fence design

Fence contractors used 500m rolls of 15/150/15 Waratah's Stocksafe-T® galvanised fence (figure 1) that included an apron and a barbed wire strung at the top (figure 2).

Figure 1. 500m rolls of exclusion fence used by fence contractors in Longreach, Queensland

Figure 2. Completed exclusion fence with star pickets at 7m spacing and 1.6m total height

Posts were installed similar to WA using a pneumatic posthole driver and a gib crane off the back of a ute. These were generally 7m apart and end strainers **anywhere up to 8km apart**. Contractors indicated they typically strained up 2km apart at a time with an overall finished fence height of 1.6m.

A Drill stem with a 90mm diameter and 7mm wall (figure 3) is commonly used for strainer ends with a cost around $250 to install. In some cases standard gauge railway line was also used for strainer ends (figure 4).

Figure 3. Drill stem being driven into the ground for in line strainers and strengtheners

Figure 4. Strainer ends made from gauge railway line

The AWI “Eazywire” fencing machine and loader (figure 5) are used for running out and straining wire at the same time, so that the fabrication can be tied off at the posts as the wire is run out. The Ezywire® spinner can be loaded with 3 x 250m or 2 x 500m rolls of prefabricated netting up to 1.8m wide.

Figure 5. AWI Eazywire fencing machine (see video on youtube.com/watch?v=W_zhO7l6EJw)

The loader also has the post driver/rock breaker attachment for the installation of strainer posts (figure 6). In-line fence strainer used has a 90mm diameter with a 7mm wall drill stem driven 1.2m into the ground (figure 7). The estimated cost for the drill stem cut to length is approximately $40 – about half the cost of the Waratah “Ezy Slot drive in strainer” ($74.63).

Figure 6. Front end loader with post driver/rock breaker attachment inserting an in-line strainer

Figure 7. In line fence strainer at a 2km strain of 15/150/15 fabricated netting with temporary strut in place

A second wire roller in use by contractors used a different concept of running out wire. The “Fast Fencer” runs the wire out in a standing position leaning on the posts (figure 8). Once a strainer is reached, a hydraulic clamp is tightened onto the fence fabrication and the machine carrying the Fast Fencer moves forward and strains the wire at the same time until there is correct tension for tying off at a strainer.

Figure 8. Fast Fencer machine and upright 500m wire rolls

Contractors were also using a custom modified wire roller off a flatbed truck (figure 9) to strain 2km sections of fence. The truck carries the multiple 500m wire rolls to site as well as straining the fence. Contractors advised the truck set up was just as efficient as either of the wire rolling machines and could be completed with two staff, as opposed to around four staff needed to efficiently use the wire rolling machines. The 500m fence rolls were lifted either with a forklift attachment on a Bobcat or front end loader onto the truck and rolled out off the back of the truck. Posts are installed using a pneumatic post driver off a gib crane from the back of a ute or small truck.

Figure 9. 15/150/15 x 500m fence rolls on truck to be rolled out on custom wire roller mounted to the back of the truck

In general, Queensland fencing contractors were able to achieve longer and tighter strains of fence for the following reasons:

- Strainers are driven into the ground rather than drilling post holes to install the strainer. This last method disturbs the ground around the strainer making them less secure in the ground when straining wire from the strainers. Driving in fence strainers with the rock hammer device shown is a far more secure and faster way of installing strainers compared to drilling post holes and installing strainers into disturbed ground. The rock hammer observed could also rapidly penetrate rocky ground with a strainer offering considerable time savings.
- They use appropriate machinery to install each of the components that make a strong tight fence.
- When straining the 15/150/15 line fabrication contractors used either a loader or truck to pull the wire tight. The wire has to be as tight as possible so that animals are more likely to 'bounce' off it instead of becoming entangled and to increase the strength of the fence against animal impacts.
- The tighter the fabricated fence is strained the better the apron/lap wire bights to the ground, reducing the risk of dog incursions.

In terms of costing, the use of alternative materials for strainer assemblies, such as 90mm drill stem provides a cheaper and stronger alternative to manufactured prefabricated strainer assemblies. Additionally, to help reduce costs, longer rolls of fabricated fence of up to 500m rolls are used. This also results in fewer joins/weak points and less labour involved.

Conclusions

The Longreach cell fence funding mechanism and governance process is very different to that currently operating in WA. Longreach Council administer the funds and manages the procurement of materials and contractor services. Landholders have assumed the fencing loan from the Queensland Government through a special rate levied of 20 years.

The installation of exclusion fences in Longreach is a fast, cost-saving process designed to prevent incursions of large pests.

Longreach exclusion fencing costs are significantly cheaper than similar contracts in WA because:

- The country is relatively easy to clear.
- Contractors use specialised machinery allowing very long strain lengths.
- In–line strainer materials including railway line and drill stem being used.
- A highly competitive contracting industry driving down construction costs.
- Buying fencing materials in bulk compared to WA and cheaper freight costs.

Queensland fencing contractors were able to achieve longer, tighter and more secure strains of fence with strainers driven directly into the ground. There was no clear advantage gained from using either wire rolling machine when rolling out fabricated fence versus the flatbed truck, custom roller system.

The fencing machines proved more labour intensive for small crews compared to the flatbed truck set up.

Implications for WA

The proposed 660km Esperance Extension fence design should essentially remain the same as proposed (i.e. 10/110/15 x 500m rolls with a plain wire on top, orange droppers and 1.8m steel posts at 7m intervals). Freight costs will need to be considered if 500m rolls are to be purchased. It may be more cost effective to supply three rolls of 250m wire (750m) per pallet if only one 500m roll fits on a pallet. In sandplain country, it would be worth considering 2.1m posts at 7m intervals as opposed to 1.8m posts.

WA uses fence droppers (not used in Queensland) to assist with strengthening the fence against mass emu movements not experienced in Queensland. They also offer a visible marker to minimise animal collisions along the SBF.

Longer strains of up to 1km for the SBF are considered achievable on long straight sections of fence. At pressure points such as corners, shorter strains or maxi posts at 5m spacing can be installed – either at the time of construction or when there is noticeable pressure at those points.

Cost savings could be achieved by reducing the number of strainers used from one every 300m to every 1km, using different types of strainers and using the rock breaker system to minimise installation costs.

For WA's SBF, the modified flatbed truck roller would probably prove the most economical modification given DPIRD already owns a flatbed truck for carrying materials to site.

The type of fencing and methodology used in Queensland appears very applicable to WA's cell fencing programmes in the Goldfields, Gascoyne and Murchison. The methodology and materials could offer cost savings over the current proposed designs. However, the capital equipment expenditure to achieve the costs savings will need to be considered.

From an OH&S perspective, Western Australian exclusion fencing programs can benefit from the use of adequate and reliable machinery fit for purpose to handle larger, heavier and longer rolls of fence as is done in Longreach.

For additional details on any findings please contact the DPIRD SBF Manager, Craig Robins:

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