



Australian Government

**Rural Industries Research and
Development Corporation**

Safer Fences for Children on Farms

Effective safe play area fencing
options for rural properties

**A report for the Rural Industries Research
and Development Corporation**

by Laurie Stiller, University of Sydney and
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February 2005

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Foreword

More than half of the 30 deaths per year that occur on Australian farms occur to children under 4 years of age and drowning accounts for around one third of all deaths.

Securely fenced safe play areas on farms are a key intervention for the prevention of child death and injury on farms due to drowning and contact with farm vehicles and machinery.

Most farms and rural properties already have a house yard which could form the basis for an effective safe play area, however in many cases the purpose of the fence is to keep stock and native animals from getting into the home and garden area. With the increasing recognition of the risks to children on farms and rural properties, fences are now more commonly being used to perform a dual role of keeping animals out and young children in.

While there is a lot of practical experience and technology behind the design of fencing for animals, there is much less information about fences on farms which target children. For this reason the Rural Industries Research and Development Corporation provided core funding for a research project to identify and assess the effectiveness of house yard fence designs which are in use to assist with child safety on farms and rural properties.

The key outcome of the project is a resource for farmers and graziers with children who live on or visit their property providing practical advice on adapting an existing fence or building a new fence to help keep young children away from farm hazards and perhaps also keep animals out of the garden/house area.

This report is an addition to RIRDC's diverse range of over 1,200 research publications and forms part of our Human Capital, Communications and Information Systems R&D program, which aims to enhance human capital and facilitate innovation in rural industries and communities. The Joint Research Venture for Farm Health and Safety forms part of this program and this publication contributes to the incentives aimed at reducing the risk of serious injury and death to children on Australian farms

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- downloads at www.rirdc.gov.au/fullreports/index.html
- purchases at www.rirdc.gov.au/eshop

Tony Byrne

Acting Managing Director

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Contributing Farmers: Renee Burke (NSW) Kylie Douglas (QLD) Beverley Norman (NSW) Noeline Walsh (NSW) Geoff and Lisa Boughton (NSW) Alan Kearney (VIC) Angela Donaldson (QLD) Rosalyn Lanyon (VIC) Bill and Tracey Radford (WA) Thelma Hutchison (VIC) Leanne Lancey (VIC)	Child Care Services: Beverley Newcomen – Remote Family Services Uniting Care (VIC) Contractors: Dallas Rumbel [02]49921847 Fence Craft and Farm Services NSW Tony Lavette (02)43247144 www.profence.com.au
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Our thanks also to people who participated in the expert working group (see Attachment 1 for details).

Expert Fence Review Panel

1. Maureen Fegan – Kids and Traffic
2. Lyn Fragar – Aust Centre for Ag Health and Safety
3. Trish Malins – NSW Commission for Children & Young People
4. Lesley Day – Monash University Accident Research Centre
5. Richard Franklin – Royal Lifesaving
6. Matt Condon- OneSteel
7. David Phillips – Farmsafe Victoria
8. Ros Lanyon VIC - Farmer
9. Gary Lang WA – Farmer
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Executive Summary

More than half of the 30 deaths per year that occur on Australian farms occur to children under 4 years of age and drowning accounts for around one third of all deaths. Securely fenced safe play areas are key intervention for the prevention of child death and injury on farms due to drowning and contact with farm vehicles and machinery.

Most farms and rural properties already have a house yard which could form the basis for an effective safe play area, however in many cases the primary purpose of the fence is to keep stock and native animals from getting into the home and garden area. With the increasing recognition of the risks to children on farms and rural properties, fences are now more commonly being used to perform a dual role of keeping animals out and young children in.

While there is a lot of practical experience and technology behind the design of fencing for animals, there is much less information about fences on farms which target children. For this reason this research project was conducted with two phases:

- the identification and documentation of house yard fence designs
- assessment of the effectiveness of those designs from the perspective of child safety and the needs of farms and rural properties.

The project has identified eight generic fence designs ranging in price from \$16-65 per metre (materials only) and also ranging in effectiveness as a child barrier from unacceptable to very high (ie., pool fencing standard).

Importantly the project has established a clear set of criteria for assessing fences in rural areas and provides a basis for further improvement in rural fence design for this purpose and more widespread adoption of the safe play area concept. The project has also focussed rural fencing contractors on this issue with several new designs being developed and promoted through the process.

Introduction

Background

This background information is drawn from Fragar L, Gibson C, Henderson A, Franklin R. *Farmsafe Farms for Kids: Evidence Based Solutions for Child Safety on Australian Farms*. Moree: Australian Centre for Agricultural Health and Safety, 2003.

Injuries and traumatic deaths to children on farms is an internationally acknowledged public health problem, with a number of countries adopting specific strategic approaches (National Committee for Childhood Agricultural Injury Prevention, 1996; Doyle and Conroy, 1989). Similarly, child farm safety in Australia has received increasing attention, and Farmsafe Australia has moved to define a national strategy for child injury prevention (Farmsafe Australia, 1999).

Agricultural enterprises in Australia are generally not only a place of work, but also incorporate the family home. The potential for injury is heightened as a result of this blurring of home and work domains and the rapid cognitive and motor skill development that children are passing through (Ozanne-Smith, 1992). Qualitative data from studies involving farming families indicates that parents believe the farm is an ideal environment in which to raise children, as it emphasises the “healthy outdoors” and allows for a wide variety of challenges (Hartigan and Clarke, 1994). Consequently, in developing intervention strategies it is imperative to ensure child safety is achieved in the context of a stimulating learning environment.

There are numerous reports on child farm injuries that highlight the extent of the problem (for example, National Occupational Health and Safety Commission, 1998; Rivara, 1997). Despite this body of evidence, there is little published data on the efficacy of interventions to address the causal factors underpinning these injuries.

The creation of a safe place to play is the most frequently mentioned intervention to prevent child injury on farms (Australian Centre for Agricultural Health and Safety Guidance Note 7, 1997), although there is no literature that provides evidence for the effectiveness of this solution for drowning prevention. This specific intervention was first described by an expert Working Group examining the evidence for effective solutions to child deaths on New South Wales farms for Farmsafe New South Wales in 1993 (Child Safety on Farms Working Group, 1993).

In the case of drowning, it would need to be considered that a safe place to play is most likely to be adopted by residents with a special interest (eg parents with young children). The potential risk for visitors may still remain in many cases. During the 1989-92 period, 30.4% of all children fatally injured on farms were visitors, 37.3% of all drowning fatalities (all ages) were visitors to the farm (Franklin et al, 2000). Thus it would seem vital that education and awareness campaigns aimed at all rural people are conducted which is the intent of the RLSSA (Giles, 1995).

Similar recommendations in regard to fencing have been made by the RLSSA and SLA in their 1995 project “Towards a National Water Safety Strategy”. Based on the guidelines used in the pool fence legislation restricting access to outdoor private swimming pools, it is recommended that a child resistant fence to create a safe place to play should be 1.2 metres high with a self-closing, self-latching gate, structures such as horizontal supports that could provide footholds should be located on the ‘outside’ to prevent climbing the barrier, and the most suitable material would be a pool safety fence (Giles, 1995).

Other studies that could be considered as relevant relate to protection of children from non-traffic/driveway vehicle run over, where fencing of the driveway from the area where children play or have access has been proposed. A case control study reported by Roberts et al found that the absence of a physical separation of the driveway from the children's play area was associated with a three and a half times increase in the risk of driveway related injury (Roberts et al, 1995; and also reviewed in Neeman et al, 2002).

Current Fencing Arrangements

Many farms in Australia already have a fenced house yard. A survey of 208 people who live or work on a farm conducted at AgQuip Gunnedah in 2003 showed that some 80% have a fenced house yard. However less than 40% of that sample rated their fence as "almost impossible" or "difficult" for a child under four to leave without the assistance of an adult. There was little difference in this ratio whether or not there were children living on the farm.

This perhaps highlights that traditionally, fences have been constructed primarily to keep stock and native animals from getting into the house and garden area on a farm. However farm parents have always had to deal with the mobility of young children and their potential to gain access to dams, waterways, machinery, sheds and other hazards – so that often the fence has served a dual purpose of keeping children "in" as well as animals "out."

This project therefore sought to identify examples of fences that were currently in use and for which at least part of the reason for having the fence was to constrain children from entering the farm workplace unsupervised.

At the moment limited resources are available for the purpose of providing information regarding effective play area fencing for young children. Existing publications (eg. Giles, 1995) have recommendations based on swimming pool fencing standards. Information regarding existing fencing options, will be provided to farmers wishing to either improve their existing house yard fence, or to construct a new safe play area. Pool fencing will not be appropriate in all cases, (particularly given the high cost) so other practical designs drawing on commonly available fencing options in rural areas need to be provided to farmers.

Scope – Fence design

The project focussed on the following aspects of fence design:

- Fence structure and dimensions
- Gate design, operation, orientation
- Gate return and latching mechanism
- Surfaces under fence and gate
- Potentially harmful aspects to children:
 - Barbed Wire
 - Electric Fence
 - Finger Entrapment Regions
- Modification of existing fence designs to improve child resistance

Existing resources – Summary of pool fence requirements

Australian Standard AS 1926.1-1993 outlines requirements for pool fences, the provisions of which are “intended to be child resistant but not child proof”. The standard requires that the fence be 1.2m high, and have a lower clearance of no greater than 100mm above a finished surface. The highest lower horizontal support must be 100mm from the ground, and the lowest higher horizontal support, 1000mm from the ground. The fence must consist of either:

- flat solid material with indentation or projections less than 10mm.
- mesh with aperture size no greater than 13mm.
- vertical planks or equivalent, with gaps in between no greater than 10mm.
- vertical members displaced no greater than 100mm, as shown in Figure 1

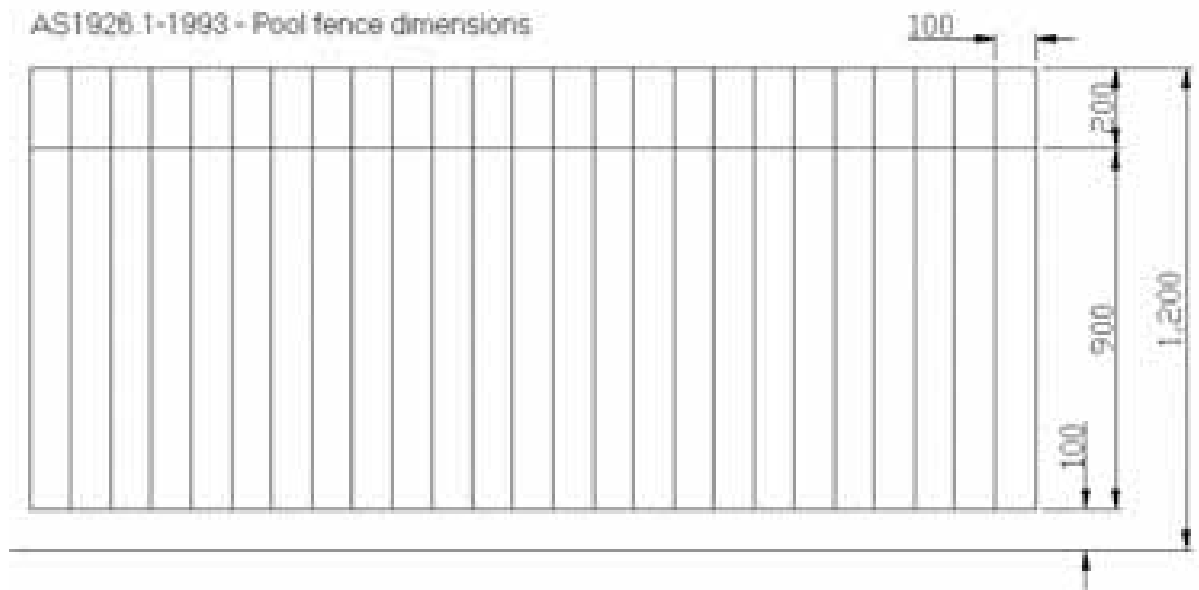


Figure 1: Pool fence dimensions recommended by AS1926.1-1993 (Scale diagram)

Gate mechanisms must be self - closing and self - locking from any position, including adjacent to the latch mechanism.

The pool fencing Australian Standard is not enforced uniformly across Australia, with each state attributing different regulatory requirements.

This project is not limited to the requirements of the standard. Farmsafe Australia is mindful of different necessities in rural regions for practical, cost effective fencing that, in many cases is much longer than a suburban pool fence, and often must double as a stock fence. However the Pool Fencing Standard provides a benchmark for determining the quality of “child resistance.”

Objectives

This project is based on a recognition that:

- the construction of safe play areas on farms (usually a securely fenced house yard) is an effective measure to contribute to preventing the unsupervised access of children to the farm workplace and associated hazards (particularly water, farm vehicles and farm machinery) (Fragar et al 2003)
- many farms have fenced house yards but most of these are fenced for keeping animals out and not fenced in a way that would allow them to be used as effective safe play areas without modification (survey conducted by Stiller et al – in progress)
- pool fencing is the only standard currently available when advising farmers – a wider set of options more appropriate for the farm environment would make the process of adopting a safe play area simpler and more cost effective for farmers
- it is likely that some farmers/graziers and rural fencing suppliers have developed practical solutions that could be useful for others in the industry.

The aim of the research is therefore to:

- identify currently available fencing options (including gates, closing mechanisms and latches) which farmers/graziers/farm managers may use to establish a safe play area
- evaluate fencing options in terms of the extent to which fencing options provide an effective, reliable barrier to children considering maintainability, practicability and ease of construction, aesthetics and social acceptability
- publish the results in a form readily accessible by farmers who wish to implement a safe play area.

Methodology

The methodology was based around the need to complete the task in a very short period of time (commencement of project proper late February – completion mid May) and broadly consisted of promoting the “search” for good fencing options through the media and key stakeholder groups so that people with good designs would contact the Project Investigators.

Initially it was considered that “applicants” from within the farming industry would be encouraged to submit a design by offering a “prize” for the best design submitted, however this style of “competition” was ruled out by the Ethics Committee. This meant more intensive follow up by the researchers was required.

The key aspects of the methodology were:

1. Letters seeking indications from stakeholders about their preparedness to help disseminate information about the project and encourage participation
2. Obtain ethical approval from University of Sydney Ethics Committee
3. Identify fencing options by advertising and promoting the project including a contact address and phone number through:
 - Rural Press Friday Magazine
 - General media coverage (press release)
 - State Farmers and other industry organisations newsletters/member communications
 - Direct contact with fencing manufacturers, suppliers and contractors

4. Those identifying themselves as having good fences were sent a kit containing information on the information sought by the project and including an “applicant consent form”. This was followed up by the researchers.
5. Conduct field research by visiting identified farms (time constraints limited visits to NSW and Victoria) and documenting identified solutions
6. Develop assessment criteria, establish “expert panel” to review solutions against agreed criteria. This process included:
 - initial contact with potential panel members including providing draft criteria
 - sending out designs for review including a proforma to allow for documentation of comments against key criteria
 - teleconference to agree on key positive and negative features of each design
 - post teleconference review of final document wording
7. Format, publish and promote solutions (including getting input to final design from farmers on the expert panel).

Key Outcomes

Promotion of Project

Letters seeking indicative support for promoting the project were sent to the following organisations in November 2003:

- Members of the National Farmers Federation
- Executive Officers of State Farmsafe Organisations
- Country Women’s Association (National and State)
- Secretary of the Isolated Children and Parents Association

Promotion in the general media included:

- An advertisement in Rural Press Friday Magazine
- A general media release on the project issued on 25 February 2004 to radio and press outlets (this release was also sent to media managers of the National Farmers Federation Members.)

This promotional process resulted in contacts by 15 farmers and 2 contractors offering designs. Some of these did not contribute complete information and further farmers were directly contacted. In the end designs were contributed and reviewed by 11 farmers, 1 child care centre and 2 contractors.

The field trip covered 13 sites and overall 36 designs were collected. In addition to that 5 designs were submitted by mail and did not receive a visit.

Due to duplication a total of 10 designs were documented and submitted to the expert committee.

Fencing Criteria

The following detailed fencing criteria were initially adopted (drawing extensively on the Pool Fencing Standard) to guide both the collection of information on the field and the deliberations of the expert panel:

Essential Criteria:

- Effectiveness of structure as a child resistant barrier.
 - Fence/gate suitable height
 - Fence/gate suitable distance from ground
 - Fence/gate geometry inhibits children climbing
 - Surface under fence/gate; subject to wear/erosion/variability
 - Gate latches child resistant/inaccessible
 - Gate closing mechanisms prevent inadvertently leaving the gate open
 - Fence/adjoining landscaping prevents use of stackable objects
 - Other positive design aspects (eg number of exits/entrances)
- Potential to injure or harm a child attempting to scale
 - Entrapment
 - Other injury potential
- Robustness (capable of withstanding forces)

Limiting Criteria:

- Fence function – is it also required to keep cattle, sheep, feral or native animals out?
- Is the design concept suitable for modifying an existing fence?
- Cost of the fence (\$/m)
 - Materials cost
 - Installation cost

Other Criteria:

- Time required to install
- Ease of installation (DIY)
- Availability of materials for on-farm application
- Control zone around fence
- Maintenance requirements/durability/life
- Aesthetics

Findings

In addition to documenting the fence designs the following observations were made in relation to house yard fencing from the field trip:

- Rarely was one type of fencing used on the entire yard - it was not unusual to find a combination of very secure child resistant fencing and very low child resistance fencing in the one yard
- The “look” of the front fence was a high priority
- Unless a pool style fencing was installed the gates and latching tended to be manually operated (and therefore subject to being left open)
- Most fences served a dual purpose (ie for animals and children)

The outcomes of the expert review panel are summarised in the booklet containing 8 key designs prepared for farmers.

Some of the decisions of the panel in forming their assessment were:

- While recognising the role played by barbed wire and electric tape in managing animals the panel did not support their use as a means of increasing child resistance – particularly as there were other options available; where fences had a dual purpose and a barb or electric tape were to be included then these should be placed well out of reach of children
- While the pool fencing standards supports taller fencing as a means of increasing the child resistance of more “climbable” wire configurations (eg., chain wire), the panel felt the risk of the child falling from height while attempting to climb these higher fences rendered this option inappropriate
- Designs that were deemed to be very low on the child resistance scale were left in the final publication as a means of raising awareness of the limits of these configurations

Discussion of Results

This project has identified 8 designs including two designs commonly used (designs # 2 & 5 Appendix 1) but which would be inadequate for as a child resistant fencing arrangement on a rural property and six designs ranging from moderate to very good levels of child resistance.

One design (design #6 Appendix 1) was specifically engineered as a result of this project. It offers a level of child resistance very close to that offered by a standard pool fence but at half the price. This design needs further testing in the field but has significant potential as a child resistant fence on rural properties.

Another relatively new design (#3 Appendix 1), a very moderately priced fence made from bird netting and post and rail, also offers considerable potential as a child resistant fence in rural settings. This has been constructed in urban settings but has yet to be tested to be confirmed as compliant with the Pool Fencing Standard.

Also, the potential to use rabbit wire/chicken wire to retrofit existing, less child resistant fencing has been noted.

Implications

The publication of these results will further alert farmers and graziers to the need for and benefits of securely fenced safe play areas in preventing child death and injury, illustrates some practical options and importantly provides a basis for further improvements in fencing design for these purposes.

The establishment of the expert panel and specification of criteria also mean that should further designs be identified, the advice of the panel can be sought and additional designs added. This can be kept and updated on the child safety website (www.farmsafe.org.au) to provide ongoing access.

In addition it is anticipated that fencing contractors and manufacturers will assist in promoting both the concept of safe play areas and designs outlined as a means of extending business opportunities.

Recommendations

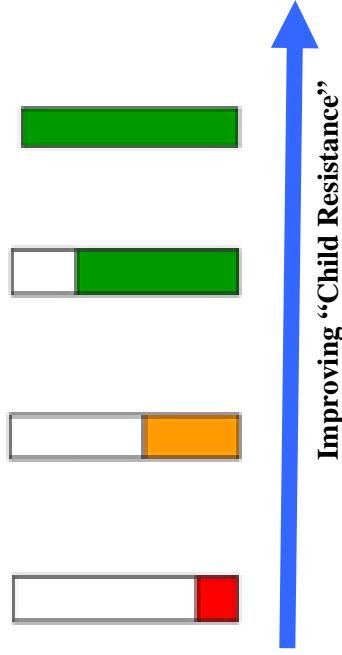
- The fence designs should be printed and made available as soon as possible as a stand alone document and included on the Farmsafe Australia and RIRDC websites. Additional designs should be added if identified. The cost of printing could be offset by advertisements from fencing manufacturers and contractors if necessary
- A media launch should be conducted to raise awareness of and promote the fence designs
- The fence designs should be incorporated into the existing Farmsafe publication “Safe Play Areas on Farms – A Resource Guide” when this is due for reprinting
- Copies of the booklet should be sent to fencing contractors and manufacturers.

Appendix 1 – Fence Designs

In a research project funded by the Rural Industries Research and Development Corporation (RIRDC), fence designs were collected from farmers, fencing manufacturers and contractors. An expert panel (see opposite) assessed the designs against the following criteria to provide guidance on the pros and cons on each design:

- Effectiveness of structure as a “child resistant” barrier (the Pool Fencing Standard(AS 1926:1993) was used as a guide).
- Potential to injure or harm a child attempting to climb the fence
- Robustness/durability/capability to withstand typical forces/corrosion and wear resistance
- Materials cost and availability
- Ease of installation, maintenance requirements
- Aesthetics and potential to customise

The fence designs on the following pages include an approximate materials only “cost indicator” and a “child resistance” indicator:



Expert Fence Review Panel

1. Maureen Fegan - Kids and Traffic
2. Lyn Fragar - Aust Centre for Ag Health and Safety
3. Trish Malins - NSW Commission for Children & Young People
4. Lesley Day - Monash University Accident Research Centre
5. Richard Franklin - Royal Lifesaving
6. Matt Condon- OneSteel
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 Leanne Lancey (VIC)

Child Care Services:

Beverley Newcomen - Remote Family Services Uniting Care (VIC)

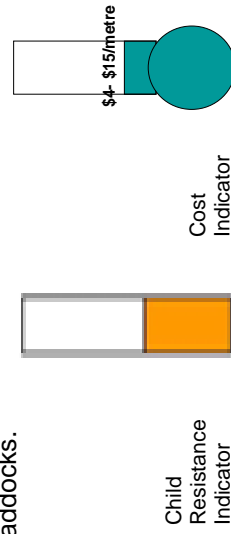
Contractors:

Dallas Rumbel [02]49921847 Fence Craft and Farm Services NSW
 Tony Lavette (02)43247144
 www.profence.com.au

Appendix 1 – Design #2 Wire Netting



- The fence is made with rabbit or chicken wire, with a 25-40mm aperture & wire thickness of at least 1.4mm.
- Horizontal (selvedge) wires support the netting. They are located on the outside of the fence to avoid providing a foothold and the bottom wire is pinned or buried to prevent children from sliding underneath.
- A standard 1050mm width roll of netting can be combined with a roll of 300mm wide netting (at the bottom) to make the fence at least 1.2m high.
- It is common to run a barb or electric wire on this type of fence for paddocks.

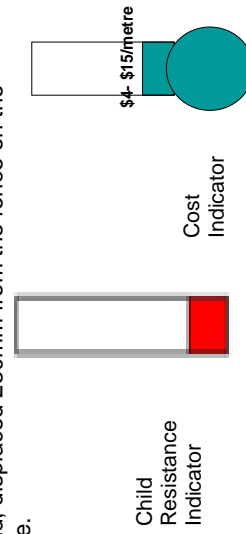


Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> • While this fence does not meet pool standards, it has been suggested that the wire is not comfortable for toddler's fingers and toes if they try to climb it; the aperture size of under 40mm, is too small for toddler's shoes. This may not deter some older/bigger pre-school aged children. • Apertures greater than 40mm reduce barrier effectiveness by making it easier to climb. • Barb or electric wire increases effectiveness as a child resistant barrier.
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> • The use of barb or electric wire increases the risk of injury to a child should they attempt to climb the fence. • All wires should be tied off neatly to avoid sharp ends, which may cause injury.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> • Wire thicknesses less than 1.4mm are prone to breakage during normal wear and tear.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> • Rabbit wire is readily available at rural fencing suppliers.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> • Installation is straight forward. Regular monitoring of the fence, particularly where stock and farm dogs etc. have access. • Using 300mm netting at the bottom of the fence can extend life of the fence as this narrower piece can be replaced when necessary • If the wire is buried, it may require replacement after a time due to rust.
6	<p>Aesthetics and potential to customise.</p> <ul style="list-style-type: none"> • A wooden post and top rail is often used to improve the appearance of this kind of fence.
	<ul style="list-style-type: none"> • This fence has the advantage of being very cheap, made of familiar and readily available materials, and is easy to construct to various support frames. • In the specified dimensions it provides a moderate level of child resistance for toddlers. • A box type stay is preferred to a diagonal stay to prevent children climbing them • The expert panel felt that incorporating barb or electric wire, introduces the risk of injury and harm to children, and that alternative fence designs are preferable. If a barb or electric wire is essential for livestock purposes take child safety needs into account, and make sure that they are well out of reach of young children and that a child could not be trapped by the wires.

Appendix 1 – Design #2 Fabricated Wire

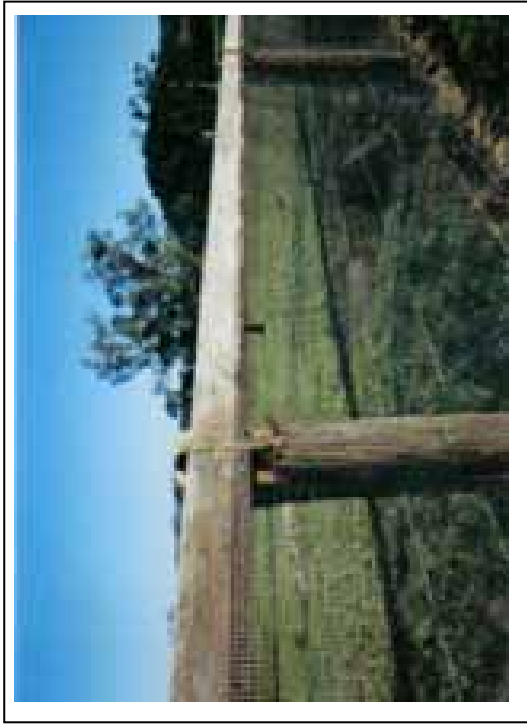


- Prefabricated fences such as “ringlock” “stocklock” or “hingedjoint” are commonly used on a paddock side of the farm yard. The bottom wire is pinned to the ground to prevent children from going under.
- Only configurations with max 15cm vertical picket spacings are likely to prevent a child climbing through.
- The pictured example shows ringlock for most of the fence, topped with barbed wire, and an electric wire running 750mm above ground, displaced 250mm from the fence on the paddock side.

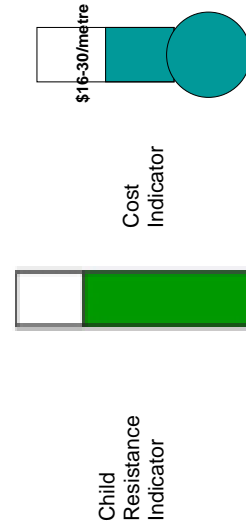


Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> • This fence is not effective as a child resistant barrier, as it is easily climbable. Children may also stretch the wire section (depending on size) to go under. • The use of barb or electric wire increases the effectiveness as a child resistant barrier.
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> • The use of barb or electric wire increases the risk of injury to a child should they attempt to climb the fence. • Depending on the aperture size, there is a risk of head entrapment if the child attempts to crawl through the fence. • All wires should be tied off neatly to avoid sharp ends which may cause injury.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> • This is a robust and long lasting fence.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> • Ringlock, Stocklock, or Hingedjoint is readily available at rural fencing suppliers. If purchasing materials, ensure that you order the 1150 mm width roll, and not the more common 900mm width roll.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> • Installation is straight forward. Regular monitoring of the fence, particularly where stock and farm dogs etc. have access, is necessary to ensure its integrity.
6	<p>Aesthetics and potential to customise.</p> <ul style="list-style-type: none"> • A wooden post and top rail is often used to improve the appearance of this kind of fence.
	<ul style="list-style-type: none"> • This fence is cheap, made of familiar and readily available materials, and is easy to construct to various support frames. • Prefabricated type fencing provides a poor level of child resistance, compared with other designs as children can readily climb over or under the wires. • The expert panel felt that incorporating barb or electric wire, introduces the risk of injury and harm to children, and that alternative fence designs are preferable. • The level of child resistance may be improved by the addition of a layer of netting (see design 3).

Appendix 1 – Design #3 12.5mm Mesh



- The use of a 1200x12.5x1.3 welded mesh over a new or **existing** fence. Aspects of this fence design:
 - The mesh must be protected by a top rail, such as timber or steel.
 - A middle and bottom horizontal (selvedge) wire on the outside supports the mesh.
 - The mesh is effectively "tensioned" by clipping it to the fencing wires, that are offset by being threaded through wooden fence posts.



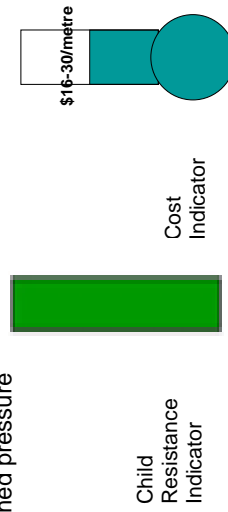
Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> This fence makes a very good barrier, and may meet the pool standards. (AS1926:1993 requires physical testing, which is yet to be conducted for this design).
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> The risk of injury is low. A pre-galvanised mesh is preferred to a post-galvanised mesh may have sharp excess pieces of zinc.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> This is a robust and long lasting fence. The mesh is the weakest aspect, and monitoring will be required to ensure its integrity.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> This mesh, often referred to as "birdwire", is readily available at rural fencing suppliers. If purchasing materials, ensure that you order the 1200 mm width roll, and not the more common 900mm width roll. Also ensure a wire thickness of <i>1.3mm or greater</i>.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> Installation is straight forward. Regular monitoring of the fence, particularly where stock and farm dogs etc. have access, is necessary to ensure its integrity.
6	<p>Aesthetics, and potential to customise.</p> <ul style="list-style-type: none"> A wooden top rail is often used to improve the appearance of this kind of fence. The mesh can be painted dark green or black (easiest done while still in the roll) to reduce its visual impact.
	<ul style="list-style-type: none"> This fence has the advantage of being relatively cheap, looks good, and can be made using readily available materials and familiar methods. The mesh can be fitted to an existing fence with a top rail (at a relatively low cost to improve the child resistant quality). This fence provides a relatively high level of child resistance.

This design was contributed by fencing contractor Dallas Rumbel - Fence Craft and Farm Services. Contact details are on the first page of this attachment.

Appendix 1 – Design #4 Solid Fencing



- Corrugated iron, or colorbond steel panels (shown) or other solid materials (eg., used conveyor belting) provide an attractive child resistant fence. Any necessary supporting horizontal structure should be on the outside of the fence.
- In high winds gates made of solid material may swing open under sustained pressure



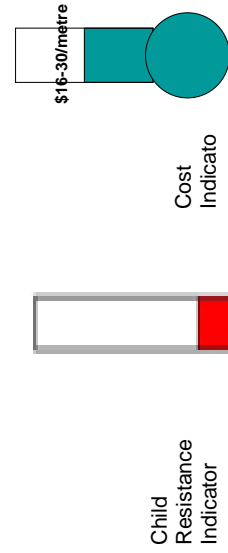
Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> • This fence makes a very good barrier, and meets the pool standards at a minimum height of 1.2m. • In high wind gates made of solid material may swing open if latches are not suitably robust
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> • The risk of injury is low if top and bottom rails are used to protect the sharp edges as shown.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> • This is a robust and long lasting fence.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> • Colorbond comes at a higher cost than corrugated iron. Both materials are readily available.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> • Installation is straight forward.
6	<p>Aesthetics, and potential to customise.</p> <ul style="list-style-type: none"> • Cannot see through the fence - whether this is seen as an advantage or disadvantage will depend on what is on the other side. • The fence may be used to block noise, wind and dust • Colorbond comes in a range of colours and styles.
	<ul style="list-style-type: none"> • This fence is of moderate cost, and provides a high level of child resistance. Part of the fence could be constructed using these materials, particularly to screen noise, dust, wind, and to provide privacy.

Appendix 1 – Design #5 Chain Wire



Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> This fence does not meet the pool standards, and is easily climbable, due to the large aperture sizes, and the sturdy construction. At 1.8m, the fence provides a higher degree of child resistance.
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> At 1.8m, there is an increased risk of child injury if they fall in an attempt to climb over the fence.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> Chain wire is sturdier than chicken wire, and is durable and with a long life.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> Chain wire is of low cost, and is readily available. However, the most common supporting structure is round hollow section galvanised pipe, which is approximately \$20 per metre for materials only. This cost is naturally higher for a 1.8m fence.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> Installation is straight forward, with low maintenance requirements.
6	<p>Aesthetics, and potential to customise.</p> <ul style="list-style-type: none"> A wooden post and top rail is often used to improve the appearance of this kind of fence.
	<ul style="list-style-type: none"> This fence is easily climbable. There are other options available that are equally attractive and durable, but provide a better barrier for children.

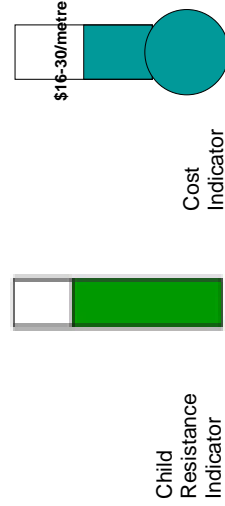
- The "chain wire" fence is popular, and used in various configurations. It often accompanies a round hollow section steel frame, or a post and rail arrangement, as shown.
- This material has been used at heights of 1.2m and 1.8m.



Appendix 1 – Design #6 5mm Wire Panel



- This fence is manufactured in panels 3m wide, by 1.2m high. The wire thickness is 5mm, and is erected by tech screwing the panels to RHS posts.
- The distance between the furthest apart horizontal supports is 800mm, which makes it difficult for a young child to scale this fence.



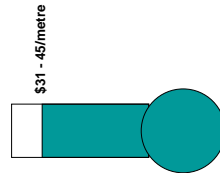
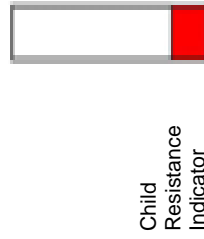
Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> • This design has been developed to target the rural farmyard market, and comes close to, but does not quite meet the pool standard.
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> • There may be a risk of head or limb entrapment in the vertical sections due to the flexibility of the 5mm wire.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> • This product is galvanised, and is therefore long lasting.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> • The cost is approximately half of similarly designed pool compliant fences.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> • Installation is straight forward, with low maintenance requirements.
6	<p>Aesthetics and potential to customise.</p> <ul style="list-style-type: none"> • It is possible at additional cost to paint or powder coat this product to improve the appearance.
	<ul style="list-style-type: none"> ▪ This design offers good potential to provide a relatively high child resistant fence – particularly for younger children - at moderate cost, for rural settings. • Further field testing is necessary to further assess design integrity, safety and durability.

This gate design was contributed by fencing manufacturer and contractor Tony Lavette of Profence. Contact details are on the first page of this attachment.

Appendix 1 – Design #7 5mm Wire Mesh



- This fence is manufactured in panels 3m wide, by 1.2m high. The wire thickness is 5mm, and is erected by tech screwing the panels to RHS posts.
- This can be seen as an example of any mesh fence, where the horizontal wire supports are close enough together to provide a sturdy climbing support.



Comments on Design against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> • This fence is not effective as a child resistant barrier, and is easily climbable.
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> • The risk of injury is low.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> • This product is galvanised, and is therefore long lasting.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> • The cost is less than similarly designed pool compliant fences. • Currently this product is widely distributed.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> • Installation is straight forward, with low maintenance requirements.
6	<p>Aesthetics, and potential to customise.</p> <ul style="list-style-type: none"> • It is possible at additional cost to paint or powder coat this product to improve the appearance.
	<ul style="list-style-type: none"> • This design is not effective as a child resistant barrier, and is easily climbed.

Appendix 1 – Design #8 Pool Compliant Fencing



- The most cost effective pool compliant fencing of this type consists of vertical members that are either 8mm wire, or round / rectangle hollow section steel.
- The distance between vertical members is usually 80 - 90mm.
- The distance between the furthest apart horizontal supports is a minimum of 900mm, which makes it difficult for a child to scale this fence.



Comments Against Key Criteria	
1	<p>Effectiveness as a child resistant barrier</p> <ul style="list-style-type: none"> • These fence designs are pool fence compliant, and are therefore considered to be highly child resistant.
2	<p>Potential to injure a child attempting to scale the fence</p> <ul style="list-style-type: none"> • Risk of injury is low.
3	<p>Robustness, corrosion and wear resistance</p> <ul style="list-style-type: none"> • This product is hot dip galvanised, and is therefore long lasting.
4	<p>Material cost and availability.</p> <ul style="list-style-type: none"> • Cost is over \$60 per metre for materials only. • These are standard pool fencing designs, which are widely available.
5	<p>Ease of installation, maintenance requirements.</p> <ul style="list-style-type: none"> • Installation is straight forward, with low maintenance requirements.
6	<p>Aesthetics, and potential to customise.</p> <ul style="list-style-type: none"> • This product is typically powder coated, with a range of colours and decorative upper styles available.
	<ul style="list-style-type: none"> • These designs offer a highly child resistant fence. • If this type of fencing is considered too expensive for a large area, a smaller play area could be considered

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