

'ARROW PARK' - INNOVATIVE NEW SHEARING SHED DESIGN



Shearing contractor and woolgrower Hilton Barrett, with AWI and a working group of shed staff designed an innovative shearing shed considering worker safety, animal welfare, shed efficiency and wool quality.

Former world record shearer and shearing contractor Hilton Barrett from 'Arrow Park' Dubbo in Central West NSW has more than 30 years of wool harvesting experience. Hilton also operates a mixed farming and grazing operation near Dubbo where he shears between 2,000 to 7,000 head of sheep and lambs each year.

With this breadth of experience and having shorn in a vast range of sheds, Hilton and the working group were keen to develop a world-class design to address common issues that arise in traditionally designed sheds.

FAST FACTS

- The shearing shed design was aimed at providing efficiency to workers and the flow of livestock – while optimising worker safety, animal welfare and the quality of wool preparation.
- The design was developed following extensive industry consultation with shearers, woolhandlers, classers and woolgrowers, plus reviews of existing working sheds. Multiple trials led to refinements and a final design.
- The blueprints of the shed's design are available on the AWI website www.wool.com/sheddesign. The internal fit-out, incorporating the stands and yards, has been designed to have its own structural integrity so it can be built within any existing structure.
- Over 500 people have attended two open days at Hilton's shed, built based of the project designs.

OPTIMISING THE SHEARING SHED

Over time, some of these issues have become more apparent, limiting the ability to optimise the efficiency and health and welfare of his staff and sheep.

Key areas of concern for Hilton included:

- inefficiencies during penning up, which can considerably slow down shearing
- significant injuries caused to staff due to shed layout and design, particularly shearers dragging heavy sheep around corners from catching pens to the board
- the long distances walked by some of the shearing team each day (for example from the board to the wool table carrying fleeces), many kilometres in some cases

Factors contributing to these issues include:

- larger sheep, particularly relatively new composite meat breeds
- a growing number of ageing, inefficient sheds in need of maintenance
- an ageing workforce
- a general shortage of experienced workers and issues retaining staff
- more rigorous quality targets to improve woolgrower returns through less wastage, contamination of wool and animal stress
- an increased awareness of animal welfare issues.

It was recognised that solutions were needed to provide:

- more efficient and safer working environments that minimise injuries, prolong professional careers and improve worker retention
- improved efficiency to minimise wool harvesting costs and make flexible and affordable state-of-the-art shed designs readily available
- a high standard of animal welfare, including reduced stress
- less contamination and improved wool quality
- greater efficiency and through-put (higher daily shearing tallies which benefits the shearer and woolgrower).

THE DESIGN PROCESS

After sharing his vision with AWI and local project management consultants Schuster Consulting Group, 13 wool harvesting experts including shearers, woolhandlers, woolgrowers and classers, were invited to tour six shearing sheds in Central West NSW. The objective of the tour was to identify the key design features of each shed which influenced sheep flow, efficiency, wool quality and the welfare of both sheep and workers. Each expert provided an independent assessment of the sheds from their own professional perspective.

“We went to multiple sheds and picked out the best parts out of them.”

Hilton Barrett

An online survey of shearers, woolhandlers, classers and woolgrowers was also conducted. Respondents were asked to rate specific features of sheds in terms of the impact they have on the shearing process, worker safety, animal welfare and wool quality.

Critical design features consistently raised by respondents included:

- optimising lighting and ventilation
- minimising noise
- eliminating sharp edges and catch points
- reducing the length of drag and number of turns between the catch point and the workstation
- improving the flow of sheep (during filling, catching, drag and let-go)
- enhancing wool room design.

The outcomes of the shed review and survey were used to develop a prototype shearing stand complete with catching pen and let-go chute. This was trialled (as seen below in Figure 2 and refined several times before the draft plan was made available for public comment.



Figure 2: trialling the first prototype design

“It’s interesting how small changes in measurement make a huge difference to your comfort as a shearer or even the area you have to work in.”

**Jason Wingfield
Australian shearing team**

Further feedback was incorporated and once again trialled before being incorporated in the six-stand design which built at ‘Arrow Park’. The experts who were involved in the initial tour and who were consulted throughout the design and build process were invited back to observe and participate in the first trial shearing using all six stands. Further modifications were made as a result of this final trial before the shed was completed.



Figure 3: inside the ‘Arrow Park’ six stand shed

THE FINALISED DESIGN

The resulting design not only achieves many positive worker safety and animal welfare outcomes, but it also provides greater efficiency and improved wool quality.

“This design works well for all of the team, making the whole wool harvesting process run more smoothly and safely,” said Hilton.

Key features of the shed design that address the issues identified through the research include:

- a sloped, front-fill catching pen which encourages sheep flow and presents sheep to the shearer
- an almost straight drag to the workstation through catching pen doors designed to minimise impact on the shearer
- ability to move the downtube position towards and away from the chute altering the distance to the chute for different shearers and different levels of fatigue to ensure the front feet of the sheep always fall into the chute when finished
- smooth surfaces and 200mm recess into the chute, they do not protrude into catching pens
- wide chutes (800mm) with a 300mm drop off which ensures sheep are released with minimal effort

- minimal travel distance from the point of shearing to the wool table and then from the wool table to the wool press
- portable wool room plant (table, bins and press) the complete wool room is load bearing for the press
- minimal light pollution from under the shed and floor grating, but with bright, diffracted overhead lighting
- good ventilation with windows designed to naturally encourage airflow
- timber components to minimise noise
- ample room for wool storage
- amenities to ensure a comfortable and safe work environment.

The greater workflow efficiency achieved by the design reduces shearing time and the cost to the woolgrower. It also means sheep spend less time yarded and are turned out more quickly after shearing.

“Sheep aren’t penned up for as long as they are in some traditionally designed sheds which improves animal welfare. The aim is to move them through as efficiently as possible,” said Hilton.

“It’s going to be a winner for the farmer and the shearer. There’s going to be less injuries and shearers are going to last longer.”

**Cartwright Terry
Former shearing world record holder**

“It does improve everything that’s really a drama. It’s a good sloping pen, it’s a good drag, the pens are a good size, and you don’t really have to push the sheep down the chute, they sort of just fall down the chute.”

**Bill Hutchinson
Former Australian shearing team member**

“The sheep are all facing away from you so you can go straight in, just grab the head and straight back out. Your handpiece is there, pick it straight up and you’re right to go. I’d just love to see this design more, throughout NSW and all over Australia.”

Billy McDougall, shearer

THE DESIGN IS AVAILABLE TO ALL

The internal fit-out, incorporating the stands and yards, has been designed to have its own structural integrity meaning it does not rely upon the shed's superstructure and can be built within any suitable pre-existing shell. This means woolgrowers can install or repurpose an off-the-shelf or existing shed, allowing them to achieve the most cost-effective solution for their own particular circumstances.

The designs (technical drawings for a six-stand shearing shed, plus the floor plan for the 'Arrow Park' shearing shed) are available free on the AWI website.

Woolgrowers can take the design to specialist wool shed builders or any number of general builders to ensure a competitive tendering process for shed construction. The builder or contractor will be able to build as designed or extract certain elements of the design to suit specific on-site requirements.

By working with all parties involved in the wool harvesting process and striking a balance between worker safety, efficiency, wool quality and animal welfare, sustainable wool harvesting now has a bright future.

"I reckon it's great, it's going to help our industry a lot in giving a good standard to farmers to follow."

Jason Wingfield
Australian shearing team

"The benefits are available to all of the wool industry – shearers and producers," said Hilton.

YOUR QUESTIONS ANSWERED

While plenty of people acknowledged the great design, there have been questions, such as why a raised board wasn't used and why the pen doors are so low. Here we answer those and other questions.

Q. HOW DOES THE DESIGN WORK WITH A RAISED BOARD – WHY WASN'T A RAISED BOARD USED?

er the course of the project it was consistently found that the issue of raised versus flat boards ranked as having a low impact compared to other design features.

Opinions do differ, and they can differ across different roles in-shed. It is often not a matter of right and wrong, but a balancing act of many criteria for those who are building a shed. Personal preference and experiences will influence this decision. Below are some of the key opinions raised through the research in relation to the board:

- Raised boards have advantages for wool preparation as woolhandlers do not have to handle or pick up off the ground each time they prepare or retrieve a fleece. Flat boards provide handlers access right around the fleece, though woolhandlers have to kneel down each time to pick up the fleece. Quality wool preparation and woolhandler wellbeing can still be addressed through in-shed training and bending the knees.

- Raised boards potentially increase safety concerns with shearers working at raised heights. Handrails can mitigate this issue; however, they present an obstacle between woolhandlers and shearers. For example, when a shearer is having trouble restraining a sheep (especially when large sheep and rams are being shorn), woolhandlers can't easily get onto the board to assist the shearer or similarly pull the cord (which can be mitigated by stop buttons under the board).
- Some woolhandlers expressed reservations in handling wool on raised boards, as their upper body and head are working at the height of a moving animal and handpiece. Additionally, raised boards had differing pros and cons for people of different heights, often taller people end up with bruised thighs and sore lower backs from bending at the hip to get harder to reach wool at the back of the board. Woolhandling paddles can mitigate this; however, that can be seen as an additional task to do and manage

While all the different aspects were discussed, considered and evaluated as part of the project, the bottom line in terms of build came down to the decision of the owner of 'Arrow Park', Hilton Barrett, who ultimately paid for the construction. **There is however no reason why this design could not incorporate a raised board if it was wanted.**

Q. WHY USE ONE RECTANGLE WOOL TABLE AND NOT TWO ROUND TABLES?

So far, the 'Arrow Park' shearing shed has only required the use of one rectangle table. However, the board has been designed wide enough to allow for a second rectangle table to be put in if required.

A lot of feedback has generally identified rectangle tables for most situations are the preferred design compared to circular tables, however both have their advantages and disadvantages which should be considered.

Circular tables are designed for one-man operation. Advantages of round tables are that handlers do not have to walk around the tables, fleeces can be thrown from any direction, they are often height adjustable, and one handler can operate two tables. Comparatively though they require a change in fleece throwing technique, larger tables may be required for larger fleeces and rolled fleeces cannot be held at one end.

Rectangle tables typically require two handlers and allow for fleeces to be fully spread, given the longer length of the table and still have space for a rolled fleece at one end. As this table has corners, the crutch, legs and neck will land in the same position. For two handlers this is effective as they both know where one another has started, typically at the crutch and move around to the neck, which helps to ensure that all wool that should be skirted is not missed.

Q. HOW DOES THE DESIGN SUIT SMALLER OR LARGER SHEDS, WITH LESS OR MORE STANDS?

The internal fit out has been designed to be repeatable, with the catching, fill, laneway pens and board layout being the same for each stand. The individual stand profiled on the back page of the 'Arrow Park' floor plan can be duplicated to the desired number of stands be it two, four or six. By keeping the design repeatable, it allows for the continued logical pen sizes, where the catching and fill pen will hold for your average shearer enough sheep for one run and the laneway pen behind it another run, totalling more than 70 head.

The maximum number of stands with this design has not been tested. The curvature of the board as it goes on will eventually become impractical and close the circle, cutting itself off. It is hoped that industry can pick up this design, its core principles and improve upon or adapt it into other designs if desired.

Q. CAN LEFT HAND SHEARERS BE CATERED FOR?

Yes, left hand shearers can be catered for. When looking at the 'Arrow park' floor plan, a left handed stand would be best added as an addition to the existing catching pen first from the left. An additional catching pen door and chute added to the opposite 'board side' corner to where it is currently located would allow for the same drag path and chute angles for a left hander.

Q. WHY ARE THE PEN DOORS LOW AND DOES IT CREATE ANY ISSUES FILLING UP?



Figure 4: straight drag to the shearing station and the pen doors clear of impact below the shearer's elbows.

The main reason is so that it is low enough to avoid impact with shearers elbows (this becomes a larger problem with heavy or steel doors). Apart from the impact, a higher and heavier door causes shearers to bend and use their bottom to take the first impact when dragging out sheep. By doing so the back angles created exert an additional stress load through their back.

The door height has not been an issue when filling the catching pen, this is due to it being a front fill pen. To avoid this for shearers in other sheds, if a catching pen is back filled, a third 'barn style' door could be added above dual lower doors, with it held open whilst shearing and shut to assist when back filling a catching pen.

Key features of the 'Arrow Park' shearing shed catching pen doors:

- High enough to baulk sheep, low enough to avoid contact with shearer's elbows
- Dual catching pen doors, lightweight timber to reduce noise and impact
- Double action swing for ease of entry and exit
- Gap below doors to stop feet getting wedged (sheep and people)
- Rounded corners
- Right hand chute door is clear of impact with the handpiece and releases before the sheep and shearer reach the shearing position.

Q. WHAT WOULD BE DONE DIFFERENTLY LOOKING BACK?

Hilton Barrett has said there are a few things that he would do differently looking back on the build. Firstly, tongue and groove timber would go further than the board area and would go right through to the woolhandling area (the woolhandling area currently has plywood flooring).

The shed currently has two emergency stop buttons at each end of the board, in reflection it would be preferred if there was one per stand.

There are a few things that could have been done to slow the sheep at the bottom of the chute, either a tapered finish narrowing the chute towards the bottom to provide support to stay upright and or a horizontal finish to the end of the chute.



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