

How responsive is the conception rate of your Merino ewes?

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The NSW Lifetime Wool project has clearly demonstrated that there is a strong relationship between liveweight and fat score at joining and the subsequent reproduction rates of Merino ewes. However the mechanism driving the increase in reproduction differs between maiden and adult ewes.

- For maiden ewes, liveweight at joining drives reproduction with fewer dry maidens and more maidens bearing twin lambs as liveweight increases (Primefact 308 *Maiden Merino ewe conception rates*).
- For adult ewes fat score and liveweight at joining both have a significant impact on reproduction of adult ewes with an increased proportion of twin bearing ewes at higher liveweights (Primefact 151 *Fat score of ewes at joining*).

Another important finding from these various analyses has been the variability occurring between Merino flocks in the magnitude of the response to ewe liveweight and fat score at joining. There is considerable variation between Merino flocks in the reproduction response to increased liveweight and fat score at joining. The national Lifetime Wool project had 15 large paddock-scale comparisons involving 1,000 mixed age ewes at each site across all southern Australian states, with three of these sites in NSW. The average reproduction response from these 15 project sites across Australia was an additional 10 foetuses scanned per 100 ewes for each extra 5 kg liveweight at joining.

However the range between flocks was considerable, ranging between 0 and 20 extra foetuses per 100 ewes per 5 kg ewe liveweight at joining. This variation is partly due to genetic differences between flocks.

Why should I know how responsive my flock is?

Knowing the likely response in your flock is critical when making decisions about feed allocation to ewes leading up to joining. While in general it is not cost-effective to supplementary feed leading up to joining for increased reproduction, the responsiveness of your flock will determine the profitability of feeding in your sheep enterprise. For example, it may be profitable to feed a +30 flock (i.e. 30 additional foetuses per 100 ewes scanned per 5 kg increase in liveweight at joining) to achieve fat score or liveweight targets at joining compared to a +10 or lower flock.

What do I need to measure and record?

At joining (no earlier than 10 days prior to putting the rams in) you will need to fat score no less than 200 randomly selected ewes from the mob and record each ewe's score against her tag number. At mid-pregnancy (between about day 80 and day 90 from joining) scan the ewes for dries, singles and twins and record the number of foetuses scanned (0 = dry; 1 = single and 2 = twins) for each ewe.

Record at joining Record at scanning

Tag	Fat score	Preg status
205	2.5	2
108	2.0	1
256	1.5	0
268	3.5	2
364	4.0	0
375	3.0	2
189	2.0	1
058	2.5	2

Figure 1. Record the fat score at joining and the number of foetuses scanned for each ewe.



Once you have this information, open the [Reproduction Response Calculator](#) in Excel and follow a few simple steps:

1. Click 'Enable Macros' on opening the calculator.
2. Click on the 'Click to start calculator' button (Figure 2)

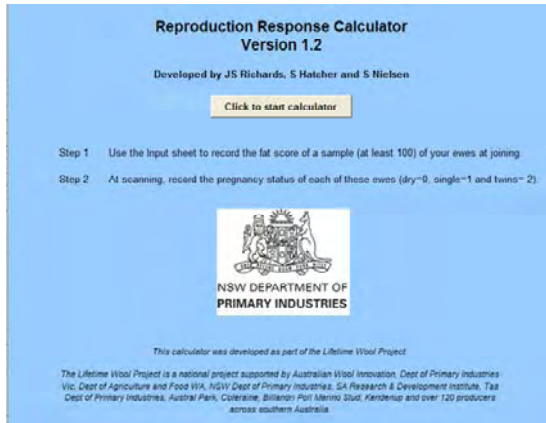


Figure 2. Start screen for Reproduction Response Calculator

3. Enter the tag list of ewes with their fat score at joining and pregnancy status in the yellow columns on the input sheet (Figures 3a and 3b). This can be cut and pasted from another excel spreadsheet.
4. Click on the output sheet tab. The calculator will display the average reproduction rate (g), the reproduction response per fat score per ewe (h) and the additional foetuses from a 1 fat score increase at joining per 100 ewes (i) (Figure 4.)

	A	B	C
1	Tag	Fat Score	Preg Status
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Fat Score	a	b	c	d	e	f	Reproduction Rate
1.0	6	1	0	1	1		100%
1.5	9	1	2	12	5		42%
2.0	83	162	78	323	318		98%
2.5	158	295	110	563	515		91%
3.0	149	1038	482	1669	2002		120%
3.5	56	634	404	1094	1442		132%
4.0	54	243	184	481	611		127%
4.5	5	26	3	34	32		94%
5.0	0	2	0	2	2		100%
Average reproduction rate							118%
Reproduction rate response per fat score per ewe							20%
Additional foetuses from a 1 fat score increase at joining/100 ewes							20.13

Figure 4. Reproduction Response Calculator output sheet.

For this example, the average reproduction rate was 118%, with a 20% reproduction response per fat score per ewe. This means that 20 additional foetuses per 100 ewes were scanned for each additional fat score at joining.

How does the reproduction response calculator work?

Step 1. First it creates a tally of your pregnancy scanning data against the fat score of each of your ewes at joining.

Step 2. Next, it calculates the number of ewes in each fat score category (d).

$$d = a + b + c$$

Step 3. After that, the number of foetuses scanned is calculated (e)

$$e = (b*1) + (c*2)$$

Step 4. From this information, the calculator determines the reproduction rate of each fat score category (f) by dividing the number of foetuses by the number of ewes and multiplying by 100.

$$f = (e/d)*100$$

	A	B	C
1	Tag	Fat Score	Preg Status
2	b0001	2.5	0
3	b0002	2	1
4	b0003	2	0
5	b0004	2.5	1
6	b0005	2.5	2
7	b0006	2	0
8	b0007	2.5	1
9	b0008	2	0
10	b0009	1.5	0
11	b0010	2	0
12	b0011	2.5	0
13	b0012	2.5	2
14	b0013	2.5	1
15	b0014	3	1
16	b0015	2.5	1
17	b0016	3	0
18	b0017	2.5	2
19	b0018	1.5	0
20	b0019	3	2
21	b0020	3	1
22	b0021	2.5	2

Figure 3. Example of (a) an empty input sheet and (b) completed input sheet.

Step 5. It then calculates the average reproduction rate of your flock (g)

$$g = \text{sum}(e)/\text{sum}(d)$$

Step 6. Subsequently, the calculator uses a simple mathematical regression to calculate a line that best describes the relationship between fat score at joining and the reproduction response of your flock (see Figure 5). The slope of this line is the reproduction response per 1 unit fat score increase at joining (h).

Step 7. Finally, the calculator multiplies the reproduction response per ewe by 100. This gives the number of additional foetuses scanned from a 1 fat score increase at joining per 100 ewes.

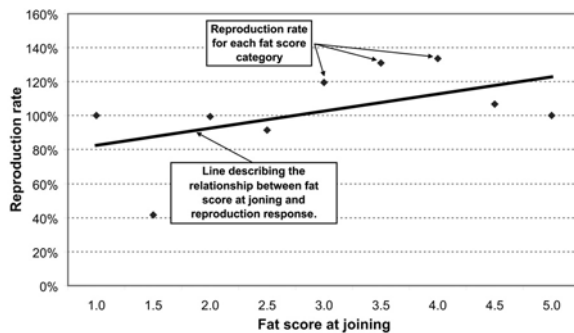


Figure 5. Graph showing the relationship between fat score at joining and the reproduction response

How does my flock compare?

The national Lifetime Wool project has shown that the response of reproduction to fat score can vary significantly between flocks (Figure 6). The average reproduction response from the 15 Lifetime Wool paddock-scale sites across Australia was 20 additional lambs scanned per 100 ewes for a 1 fat score improvement at joining, Adult ewes from the three NSW paddock-scale sites were less responsive on average as an additional 1 fat score at joining resulted in 13 extra lambs.

The [Reproduction Response Calculator](#) can be downloaded from the NSW DPI website or contact your local NSW DPI Livestock Officer (Sheep & Wool).

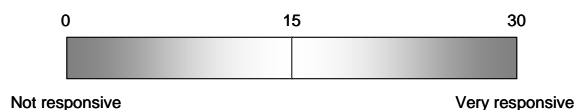


Figure 6. Merino flocks vary in their responsiveness of reproduction to liveweight and fat score at joining.

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