

Stocking Density

Final report by the the Heat Stress Risk Assessment Technical Reference Panel

How can allometric stocking densities most effectively be used?

Baseline space allowances are determined through the ASEL minimum pen area per head tables. The HSRA model will provide additional adjustments to space allowances based on expected environmental conditions.

Space allowance under ASEL is described in two dimensions (for example, m²) and is linked to an animal's weight, which exists in three dimensions. Therefore it is reasonable to relate space requirements not to weight per se, but weight to the power 0.66, which is referred to as an allometric equation. The k-value used in the allometric space allocation equation can be used to compare space allocation for different postures and is not dependent on body weight.

The panel notes the ASEL review report recommends an allometric approach be adopted for calculating on board space allowances for sheep, with a k-value of 0.030 to be applied to voyages during November to April, and a k-value of 0.033 for voyages during May to October.

The ASEL review committee's position is that the 0.033 k-value should remain in place for the May to October period and be reviewed in the light of voyage reports and industry performance after several northern hemisphere summer periods. The panel acknowledges that the ASEL review process examined stocking densities. It is therefore appropriate that the base stocking density to be used for each class of sheep should be the stocking density determined by the ASEL review that is then subject to adjustments through application of the HSRA model.

What does a 0.033 k-value mean?

From - *Independent Review of Conditions for the Export of Sheep to the Middle East During the Northern Hemisphere Summer*

Table two – A comparison of minimum ASEL area (May to October) to an allometric space allocation based on $k = 0.033$ in the *Independent Review of Conditions for the Export of Sheep to the Middle East During the Northern Hemisphere Summer* gives 24% to 39% more space to sheep weighting 35 to 60 kg.

To the best of my knowledge, a number of voyages departed Fremantle harbour with sheep to the Middle East at a stocking density of 1.15 (15% more space) than the previous minimum pen area May-Oct and encountered wet bulb readings as high as 32. The IO reports indicated there were no welfare considerations on these voyages and mortality levels were < 0.3%.

Discussions with the on board AAVs verified the IO findings and AAVs concluded that the 15% extra space over all lines resulted in excellent welfare outcomes.

Voyages with the allometric density have also had favourable IO and AAV reports in regards to welfare and mortality. However, discussions have been consistent in that both IOs and AAVs report the sheep don't evenly disperse throughout the pen. The sheep tend to congregate together and when all are resting there are areas of the pen with no sheep utilizing the open space. As sheep are flock animals and gain security from proximity, this finding is not unexpected.

My questions:

Are we using the IO data from previous voyages to determine what is the ideal sheep stocking density?

Is an additional 30% more space truly needed?

Wouldn't voyage data suggest that an extra 15% over previous requirements meet our welfare objectives?

I'd like to see the final stocking density determination based on scientific findings to arrive at the best outcome and the data from actual voyages should be given the highest consideration.

Dr H. Rebhan, DVM