

(14 marks)

The daily milk production of a randomly chosen milking cow varies, and can be modelled by a normal distribution with a mean of $\mu = 21.9$ litres and a standard deviation of $\sigma = 3.26$ litres.



Source: wernerdejen | pixabay.com

- (a) (i) Determine the probability that the daily milk production of a randomly selected cow is less than 23 litres.

(1 mark)

- (ii) Given that 15% of randomly selected cows have a daily milk production of c litres or more, determine the value of c .

(1 mark)

- (b) Let the random variable S_n represent the total daily milk production of a random sample of n cows. Explain why it is appropriate to model S_n using a normal distribution.

(1 mark)

- (e) Does the confidence interval calculated in part (d) suggest with 95% confidence that the new feeding plan has increased the mean daily milk production per cow? Justify your answer.

(2 marks)

- (f) The farmer would like the 90 cows' mean total daily milk production to be more than 2000 litres.

- (i) Determine the mean daily milk production per cow if 90 cows had a total daily milk production of 2000 litres.

(1 mark)

- (ii) Hence or otherwise, does the confidence interval calculated in part (d) suggest with 95% confidence that the new feeding plan will result in the 90 cows' mean total daily milk production being more than 2000 litres? Justify your answer.

(2 marks)