

## Contents

Milk production by herd test.....	1
Herd test #1.....	1
Herd test #2.....	7
Herd test #3.....	13
Herd test #4.....	19
Milk Production by herd.....	25
Herd A.....	26
Herd B.....	29
Herd C.....	33
Herd D.....	37
Herd E.....	41
Herd F.....	45
Herd G.....	49
Herd I.....	53
Herd J.....	57
Herd K.....	61
Coproantigen.....	64
R code.....	65

### Milk production by herd test

Herd test #1

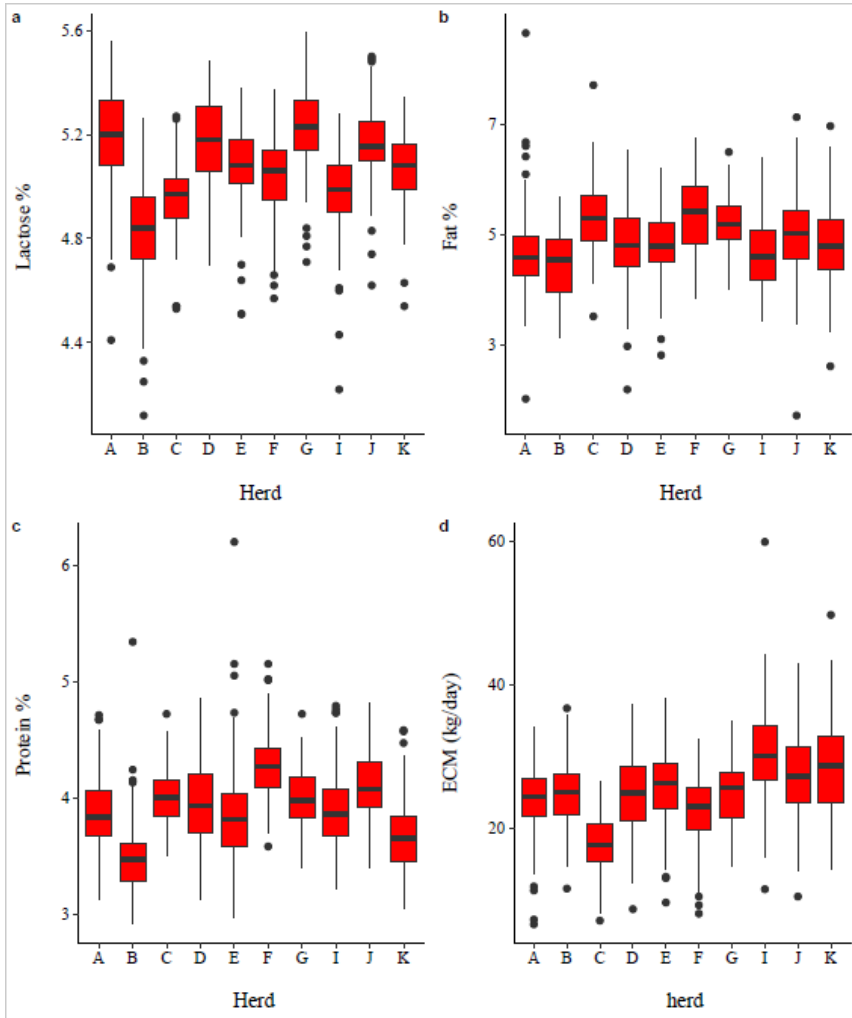


Figure 1: Summary of all cows in herd test 1, Herd and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

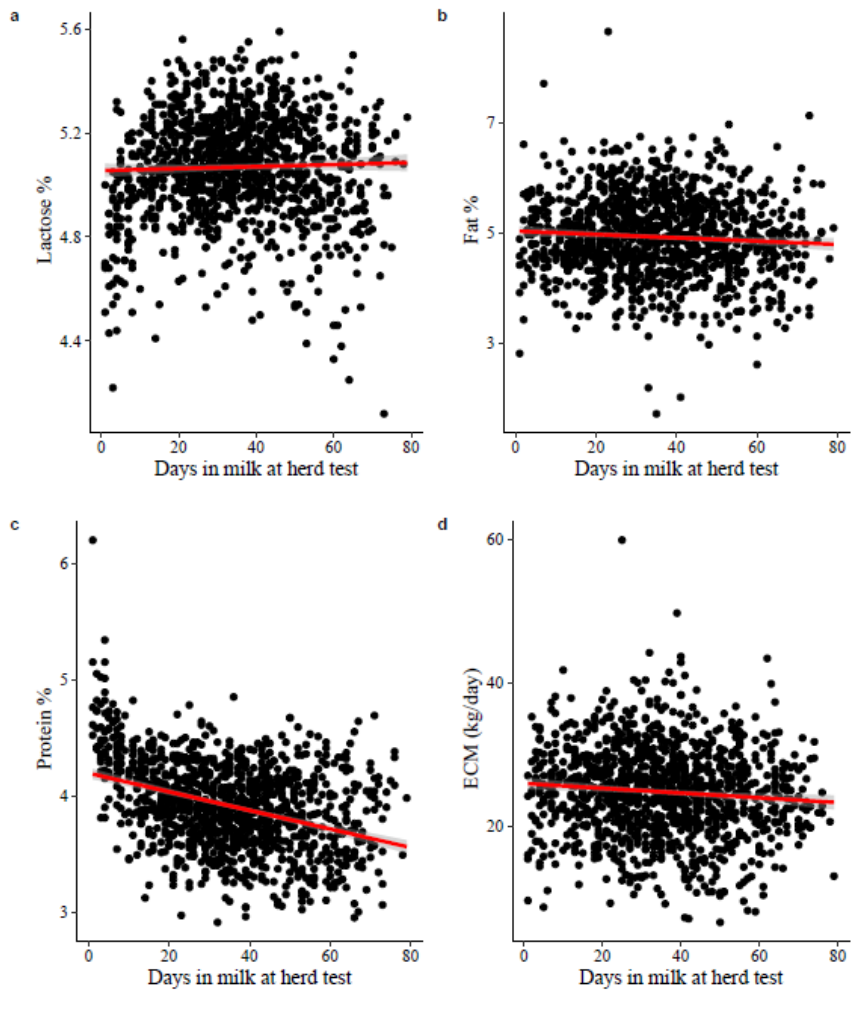


Figure 2: Summary of all cows in herd test 1, Days in milk at the herd test and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

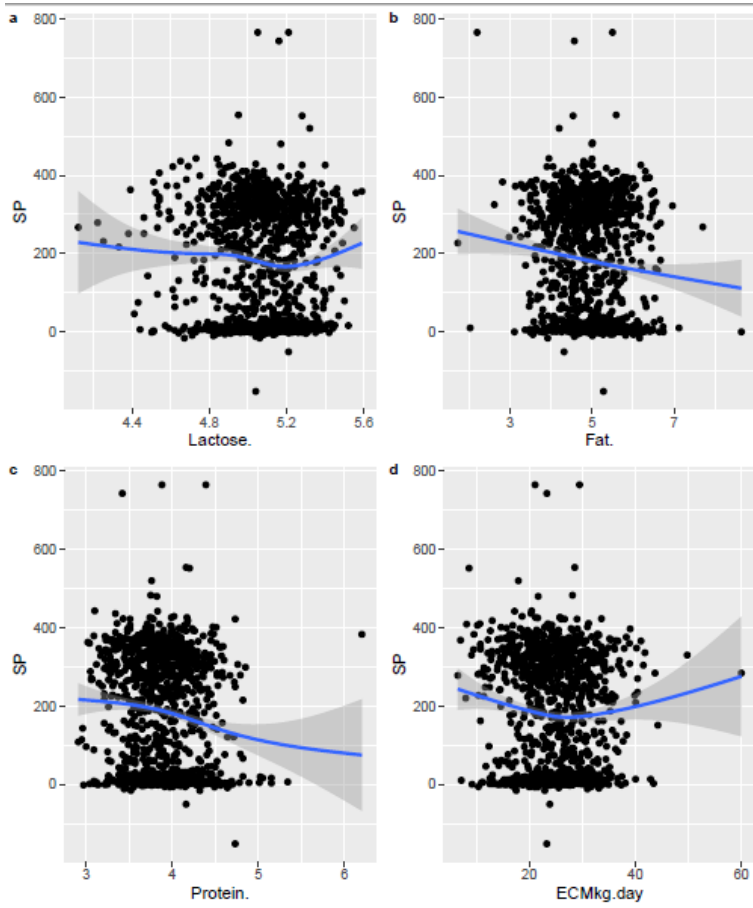


Figure 3: Summary of all cows in herd test 1, IDEXX SP% and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

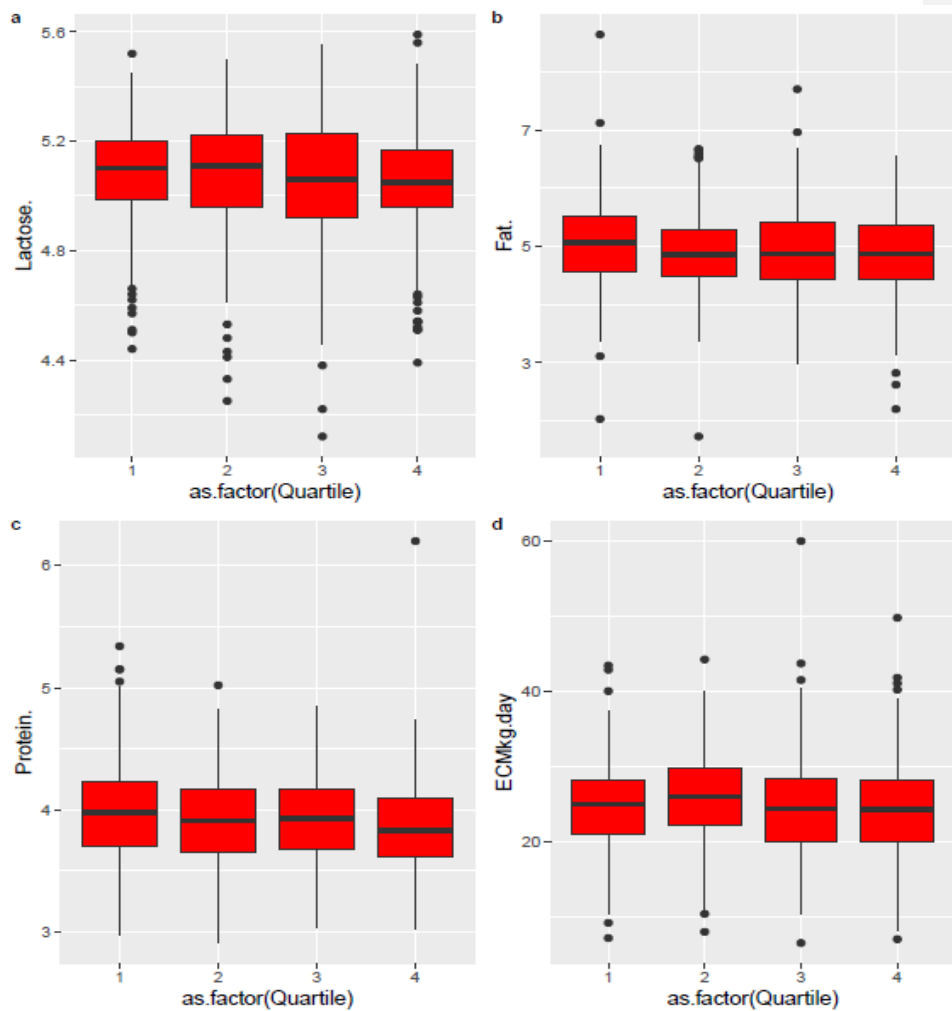


Figure 4: Summary of all cows in herd test 1, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

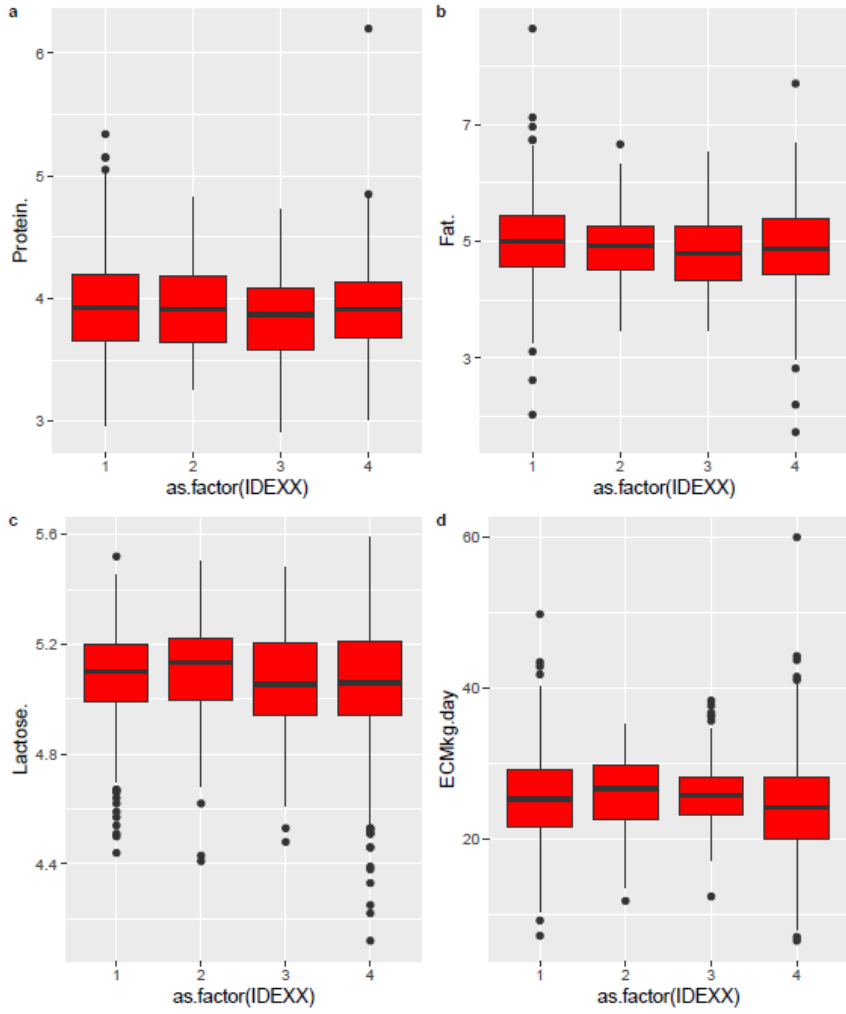


Figure 5: Summary of all cows in herd test 1, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

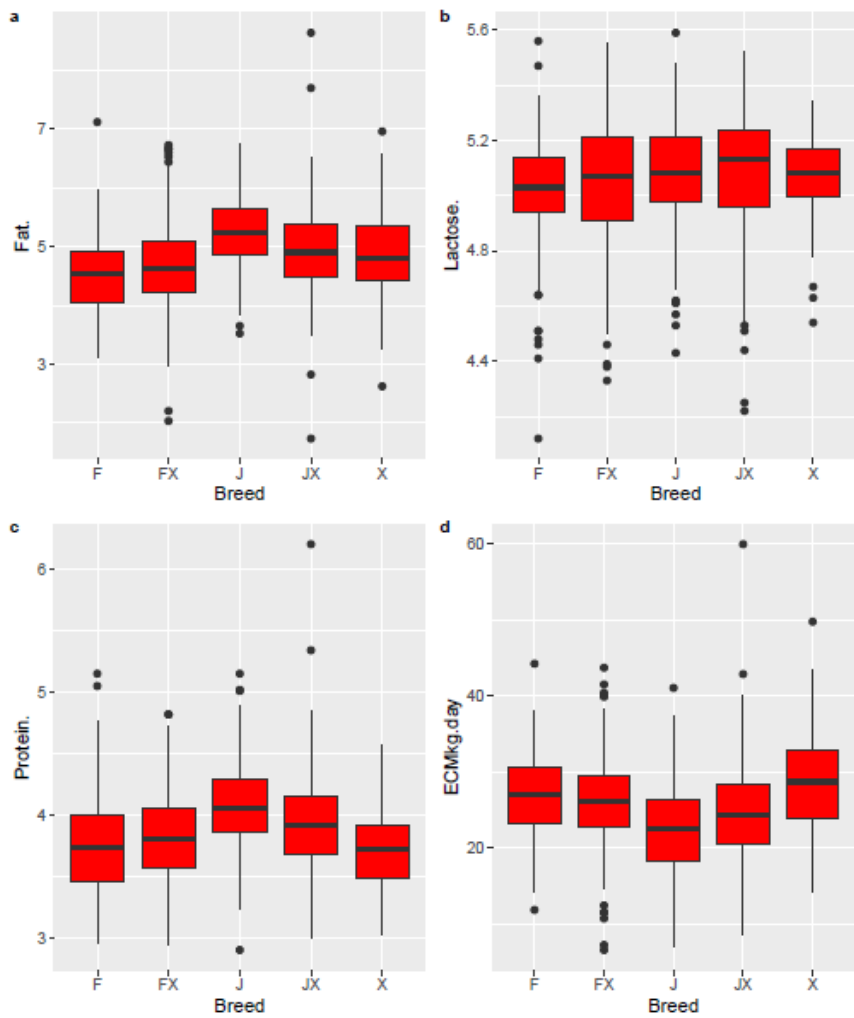


Figure 6: Summary of all cows in herd test 1, Cow breed (Friesian (F), Friesian cross (FX), Jersey (J), Jersey cross (JX), Crossbred (X), and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Commented [AD1]: Rearrange the order of tests

Herd test #2

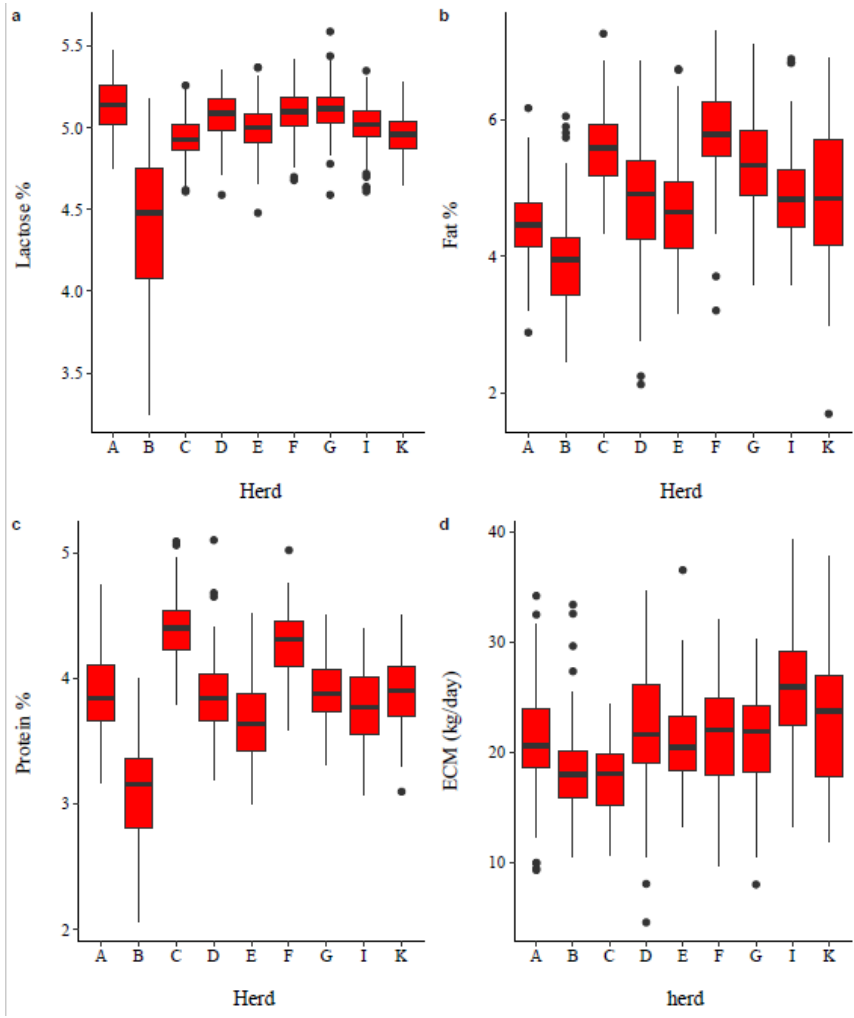


Figure 7: Summary of all cows in herd test 2, Herd and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

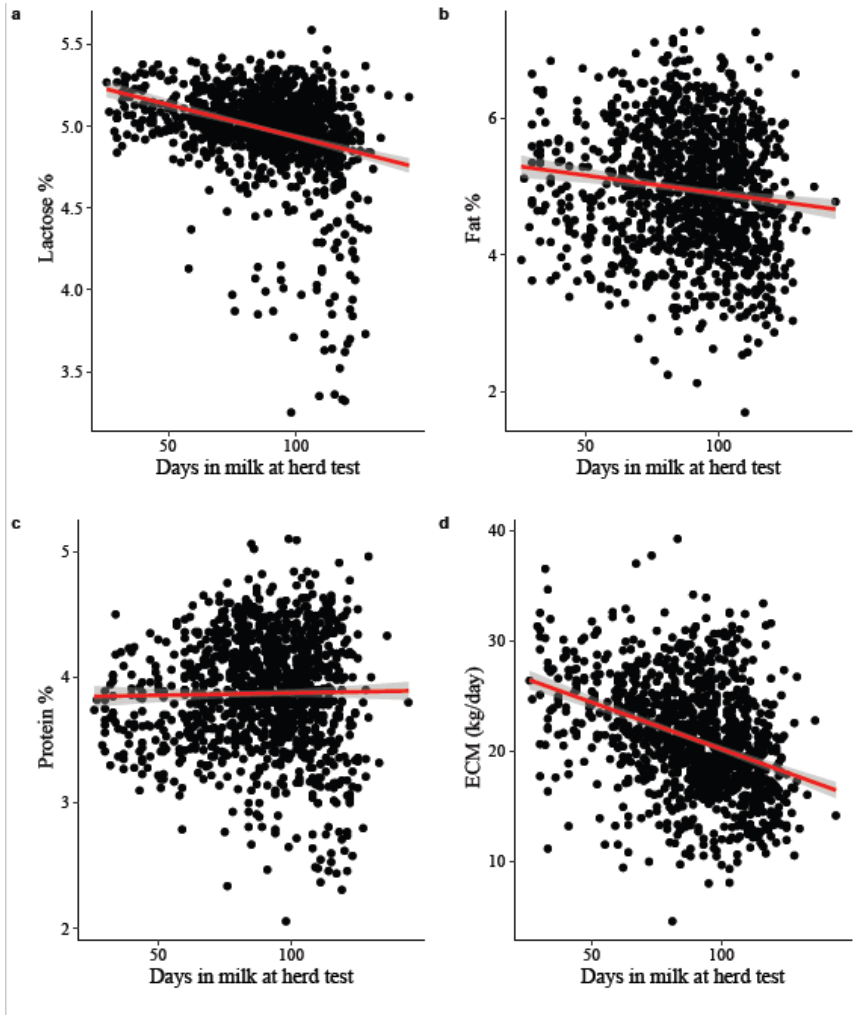


Figure 8: Summary of all cows in herd test 2, Days in milk at the herd test and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

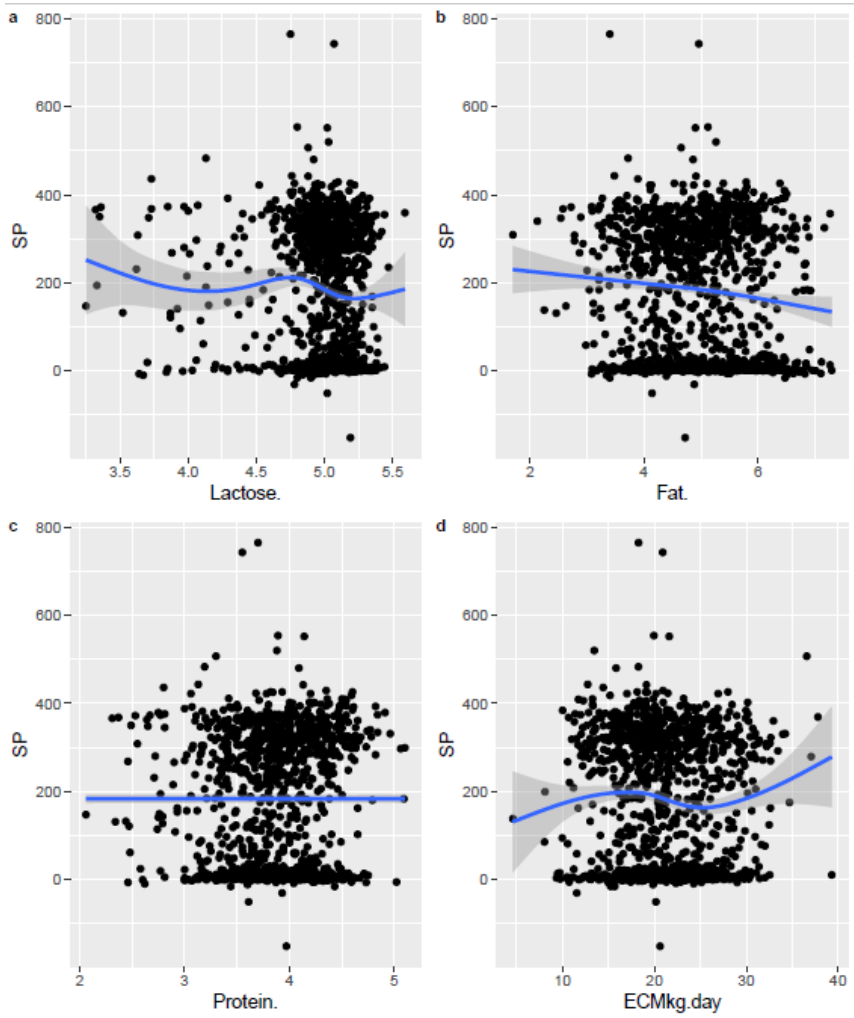


Figure 13: Summary of all cows in herd test 2, IDEXX SP% and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

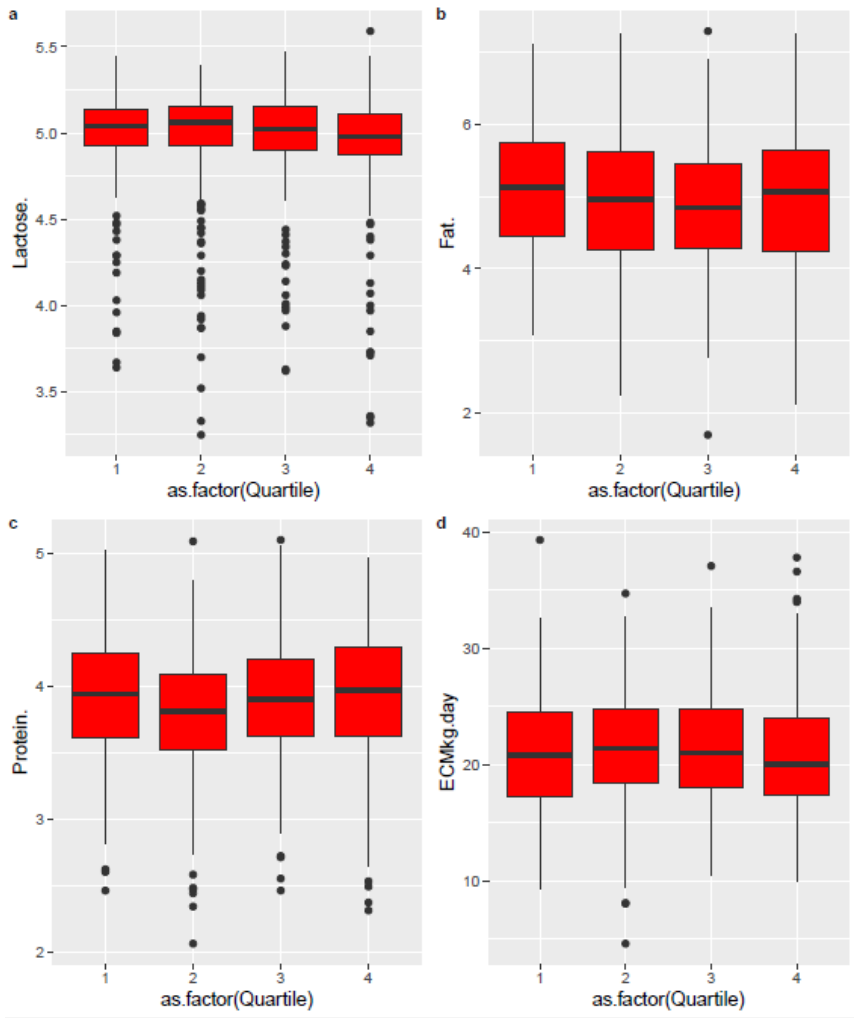


Figure 9: Summary of all cows in herd test 2, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

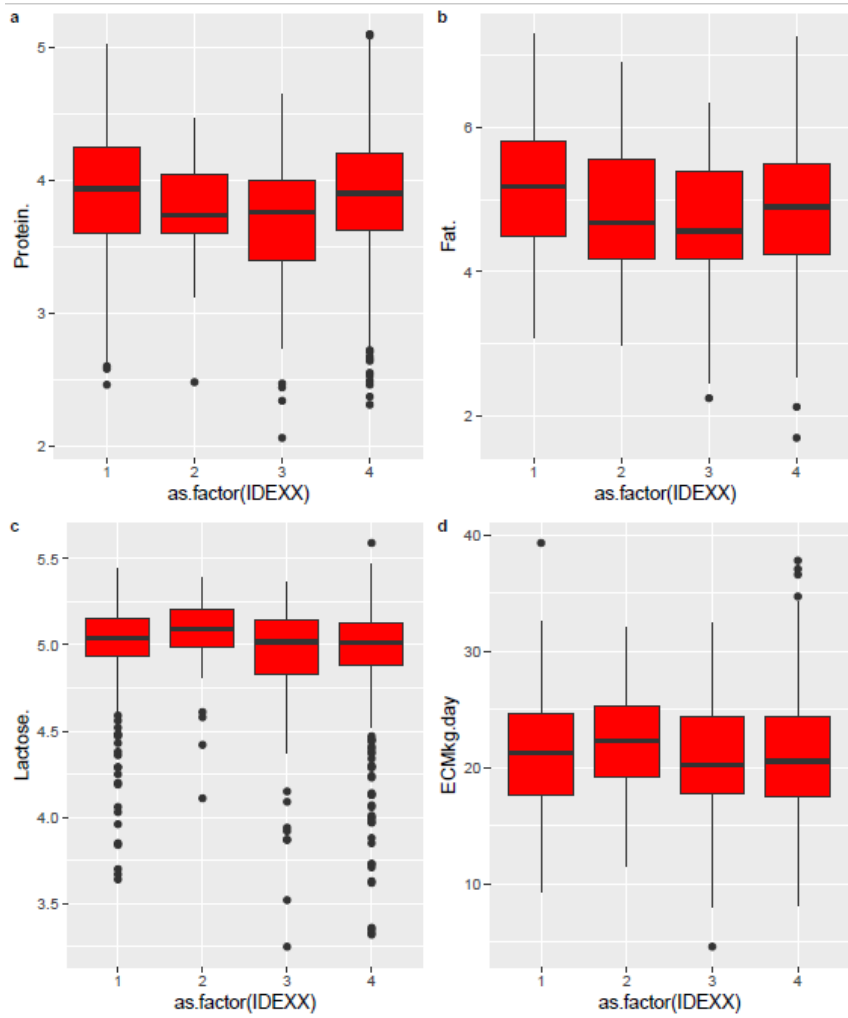


Figure 10: Summary of all cows in herd test 2, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

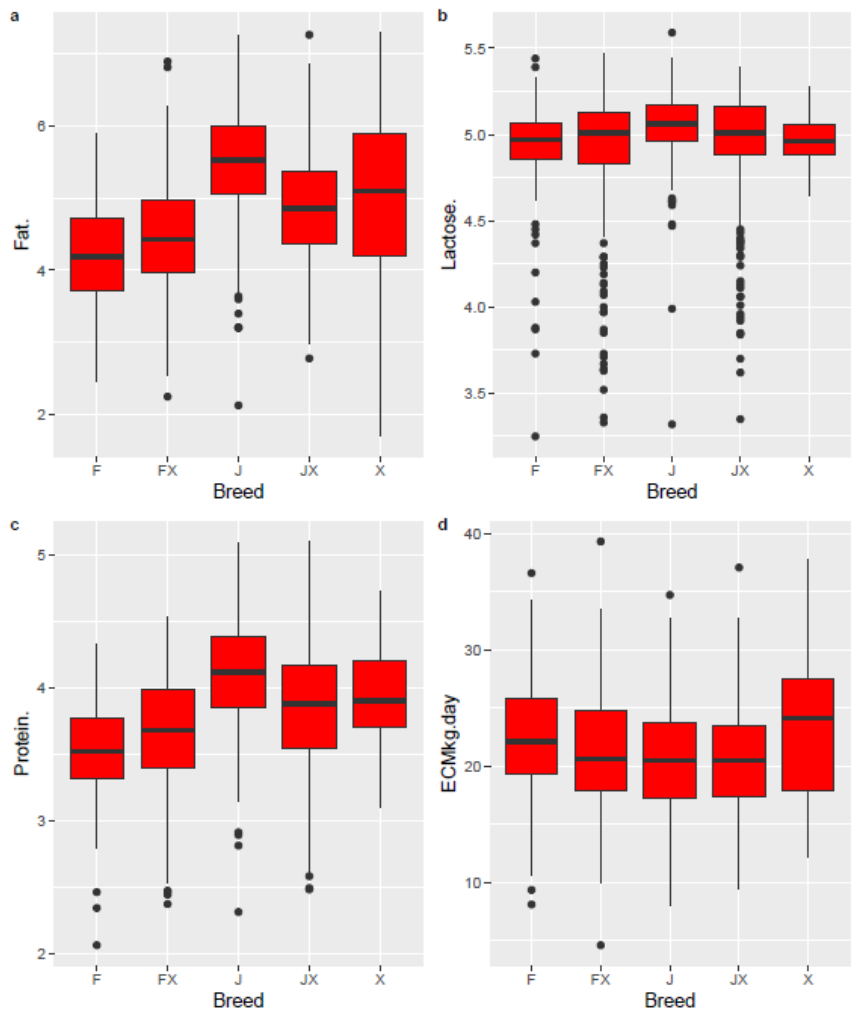


Figure 11: Summary of all cows in herd test 2, Cow breed (Friesian (F), Friesian cross (FX), Jersey (J), Jersey cross (JX), Crossbred (X), and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

### Herd test #3

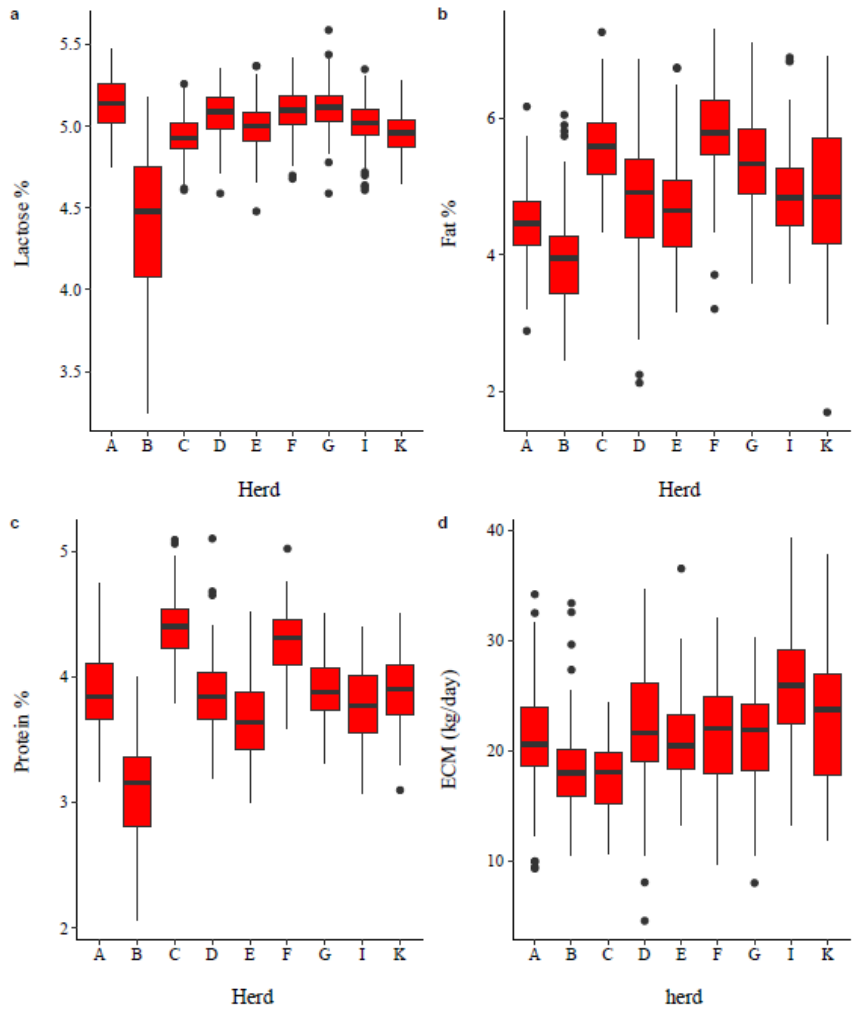


Figure 12: Summary of all cows in herd test 3, Herd and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

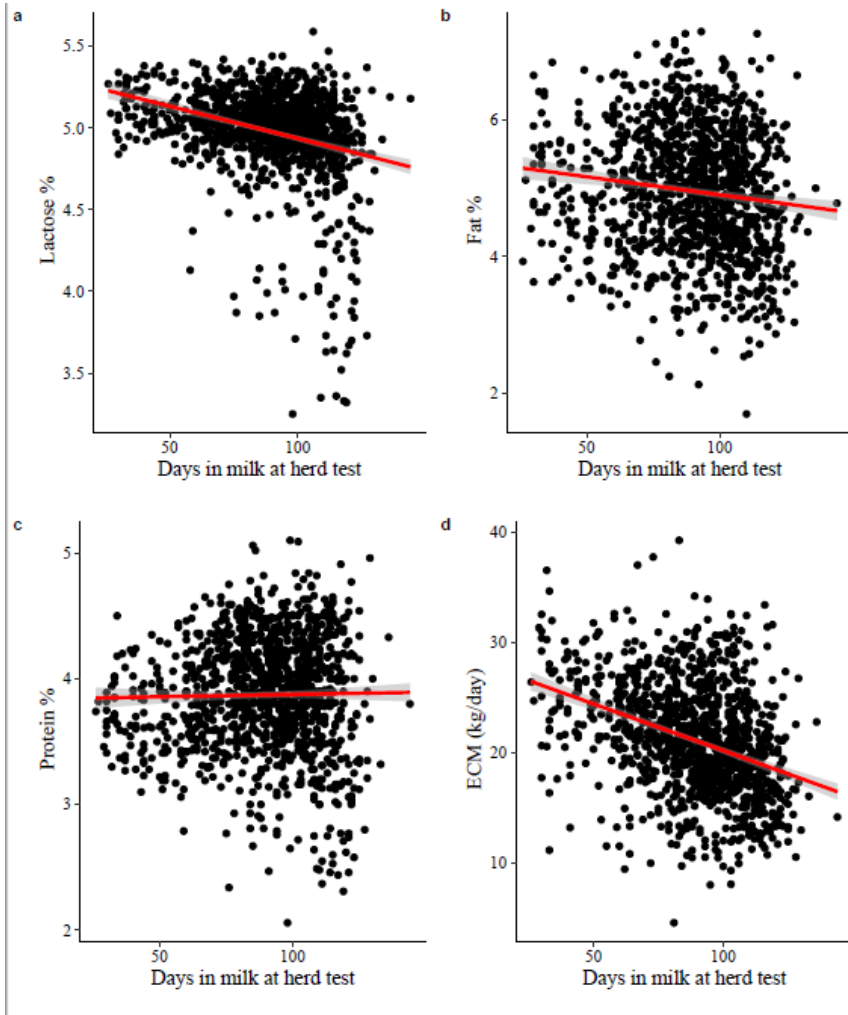


Figure 1813: Summary of all cows in herd test 3, Days in milk at the herd test and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

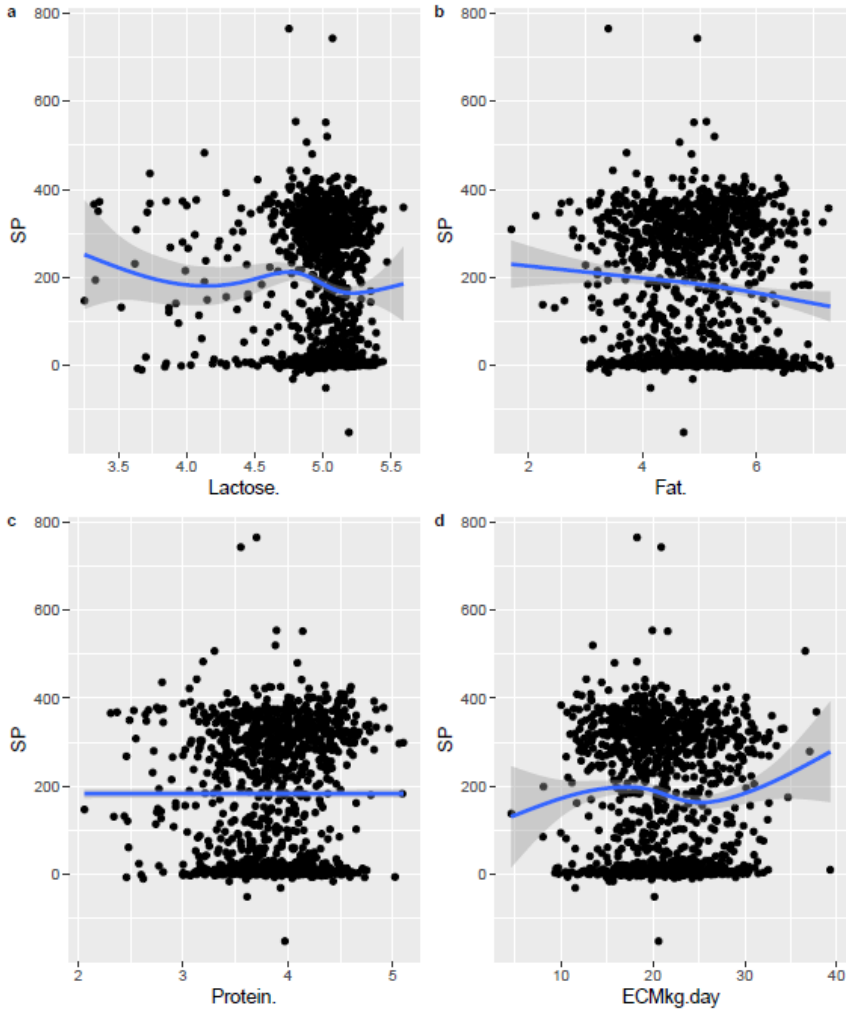


Figure 19: Summary of all cows in herd test 3, IDEXX SP% and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

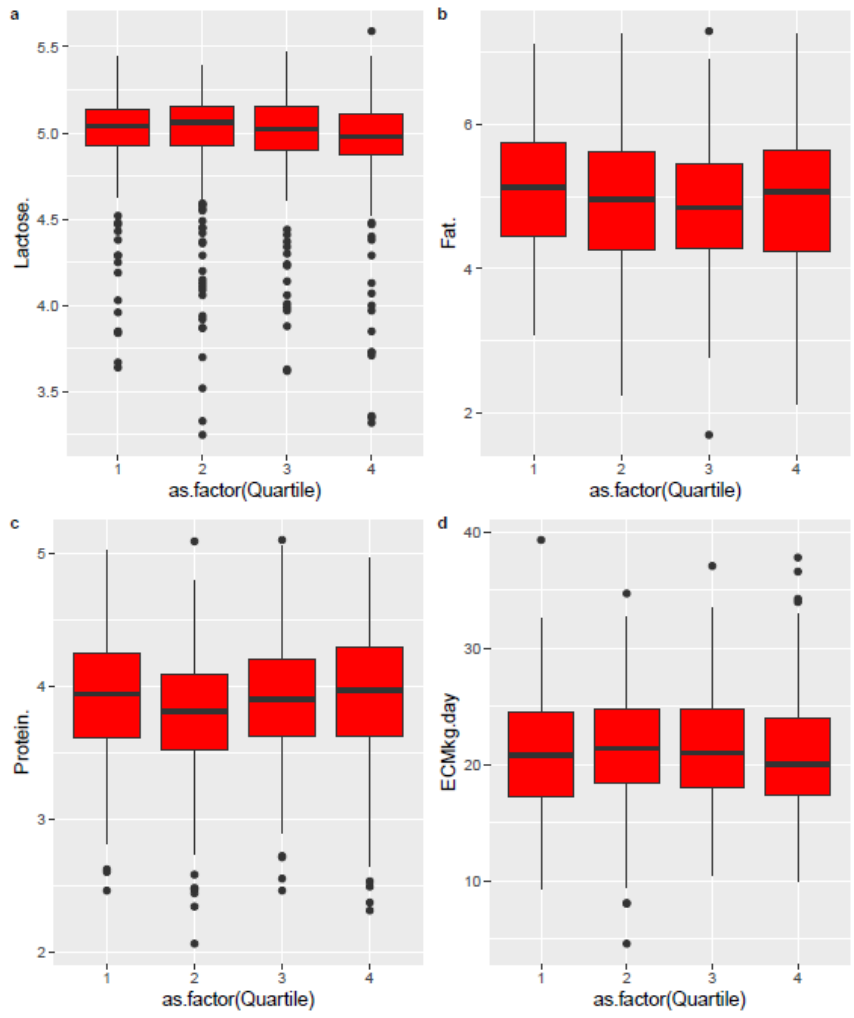


Figure 14: Summary of all cows in herd test 3, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

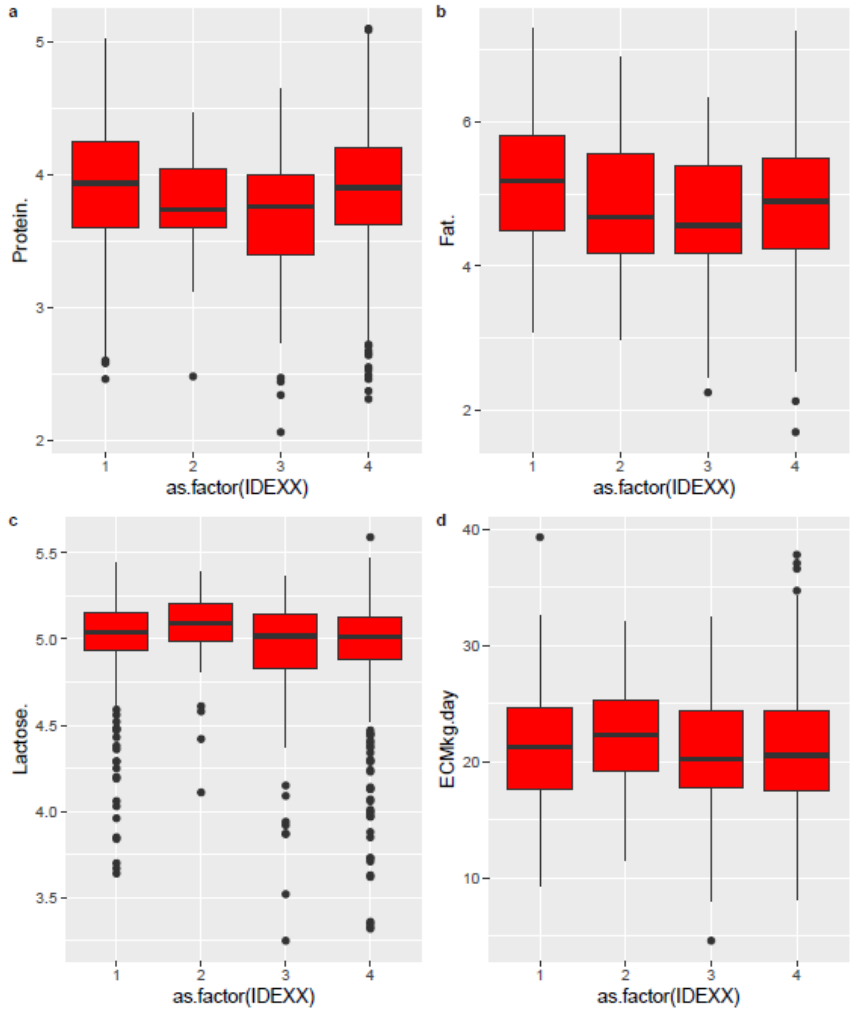


Figure 15: Summary of all cows in herd test 3, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

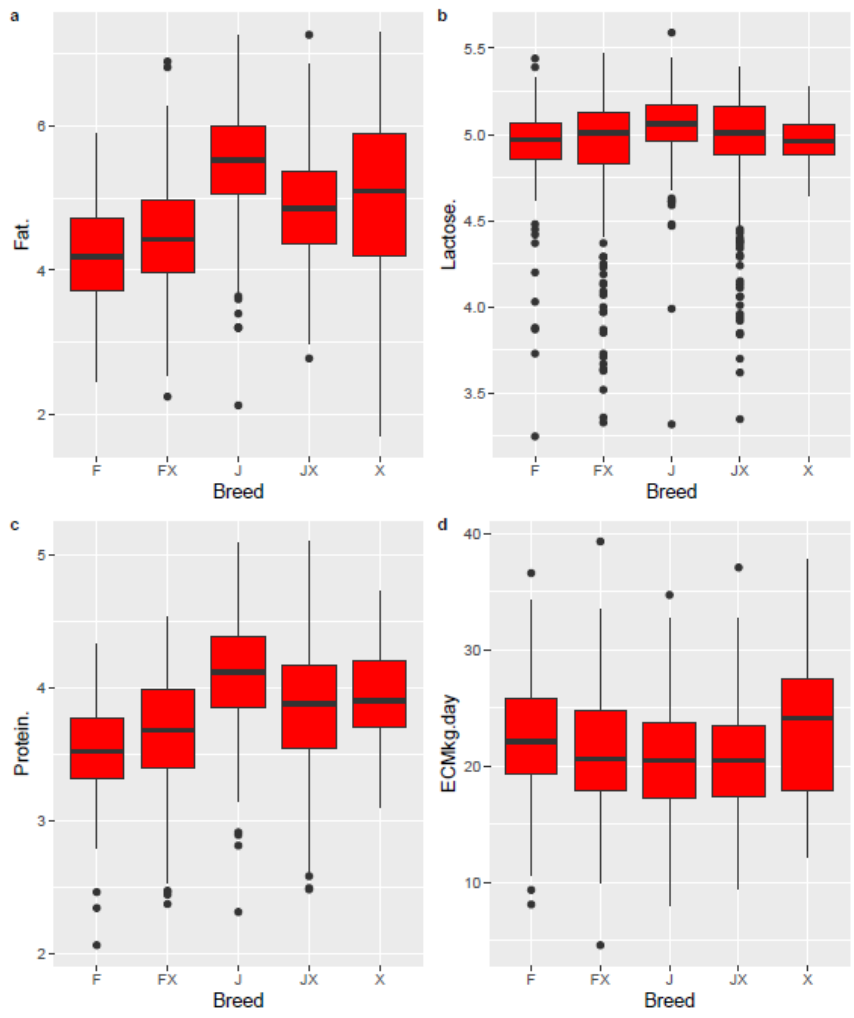


Figure 16: Summary of all cows in herd test 3, Cow breed (Friesian (F), Friesian cross (FX), Jersey (J), Jersey cross (JX), Crossbred (X), and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd test #4

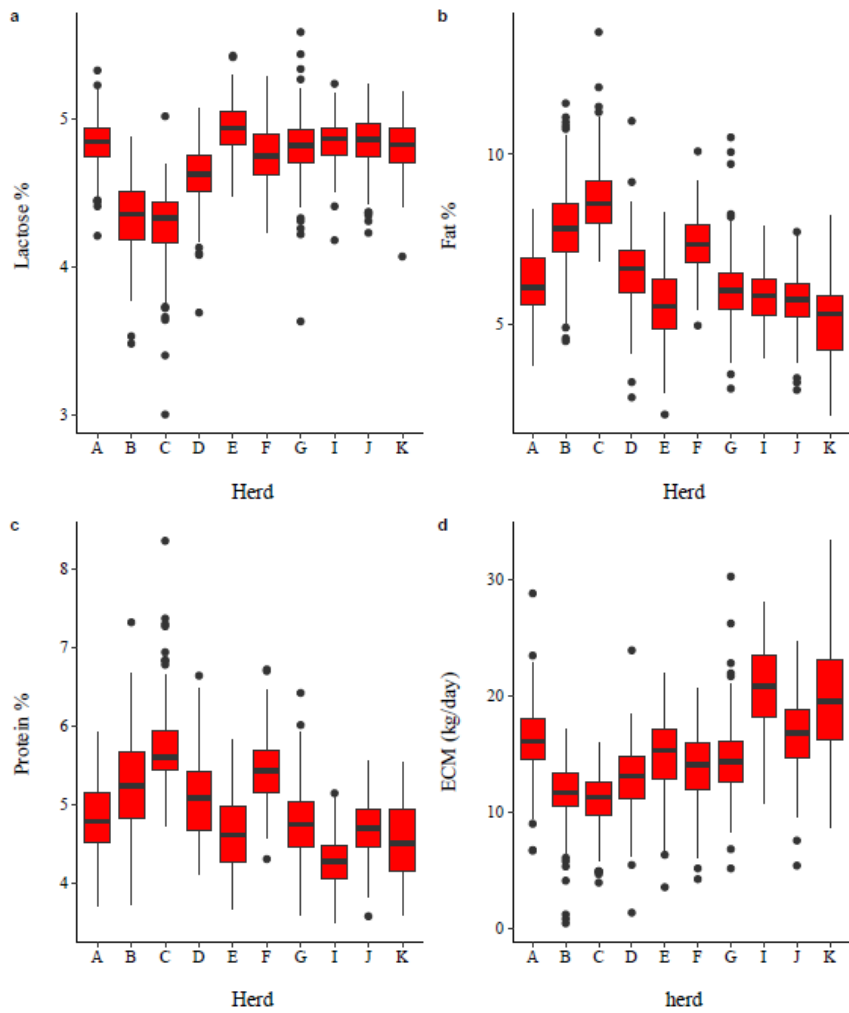


Figure 17: Summary of all cows in herd test 4, Herd and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

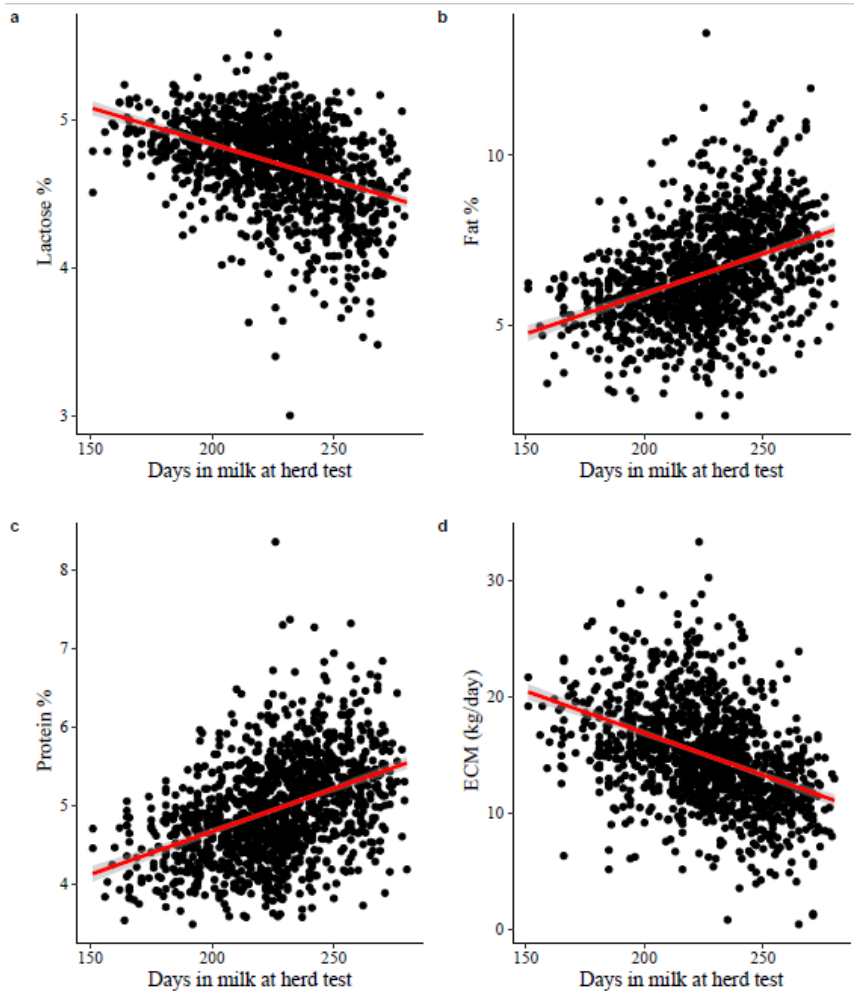


Figure 18: Summary of all cows in herd test 4, Days in milk at the herd test and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

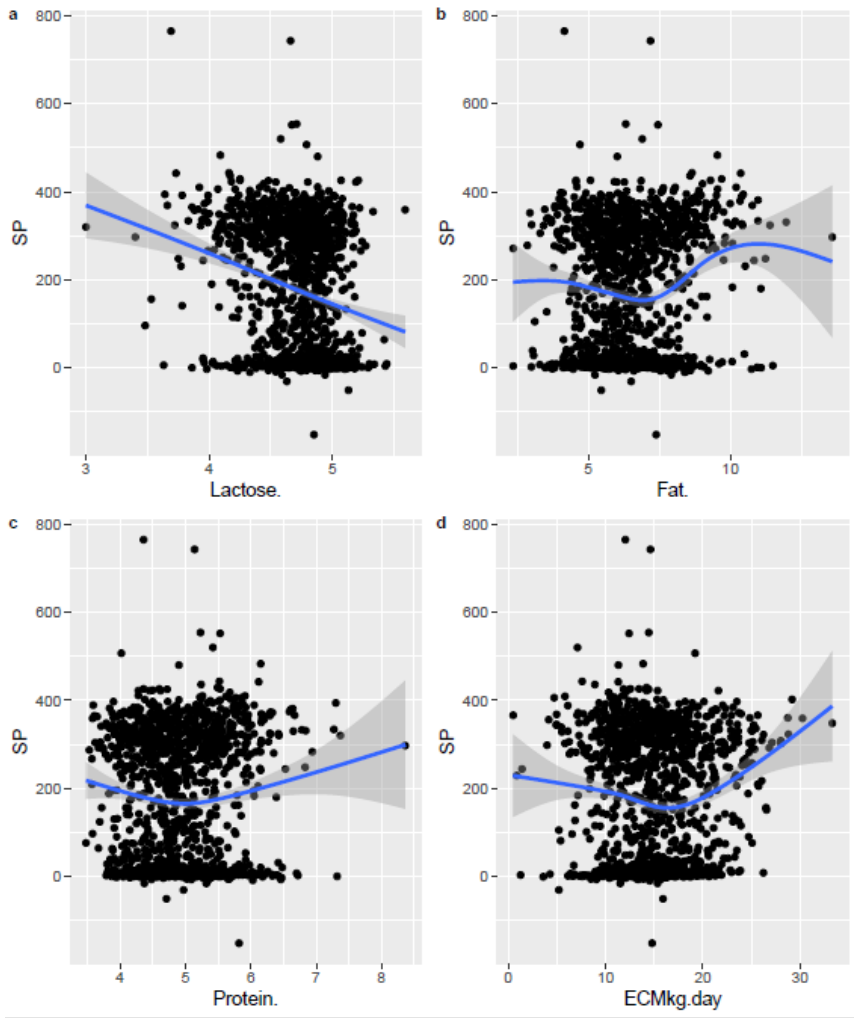


Figure 19: Summary of all cows in herd test 4, IDEXX SP% and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

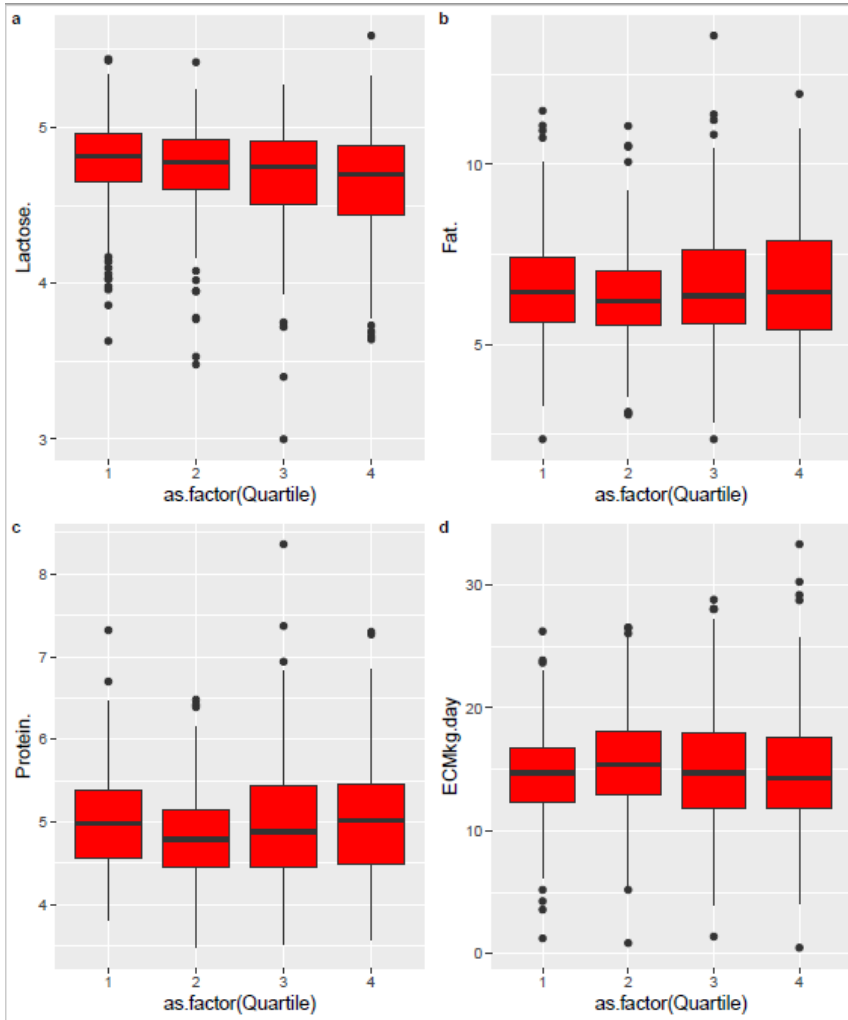


Figure 20: Summary of all cows in herd test 4, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

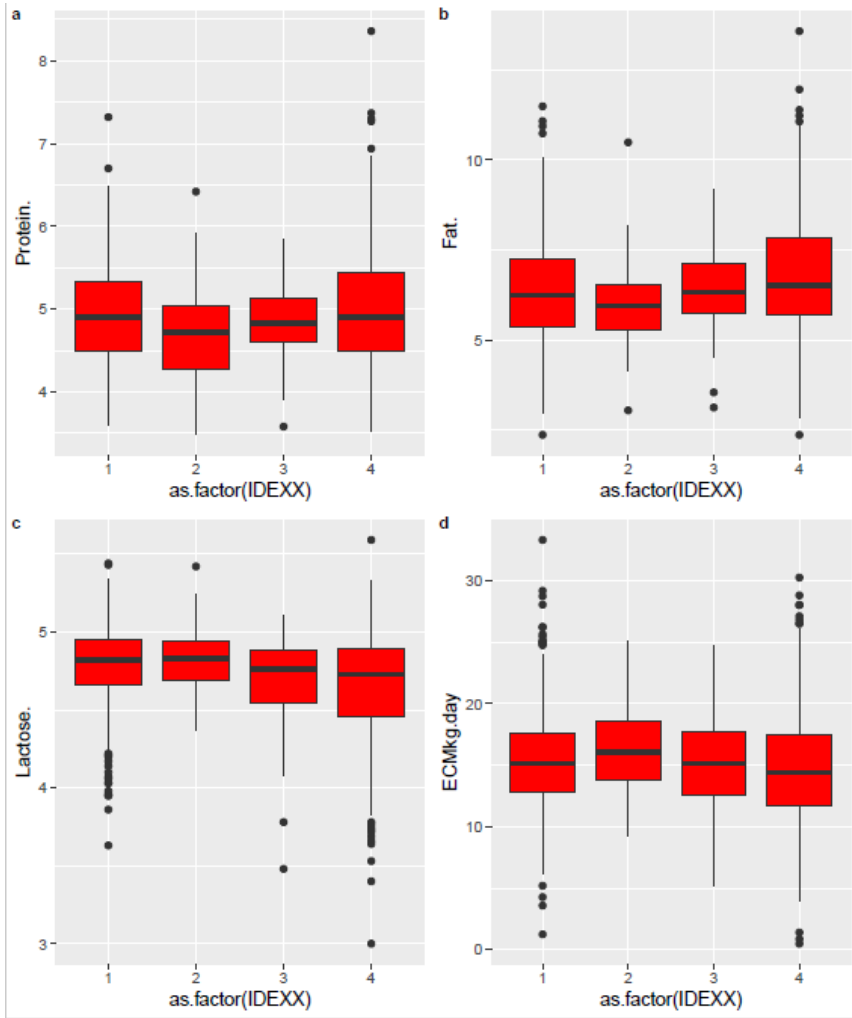


Figure 28: Summary of all cows in herd test 4, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

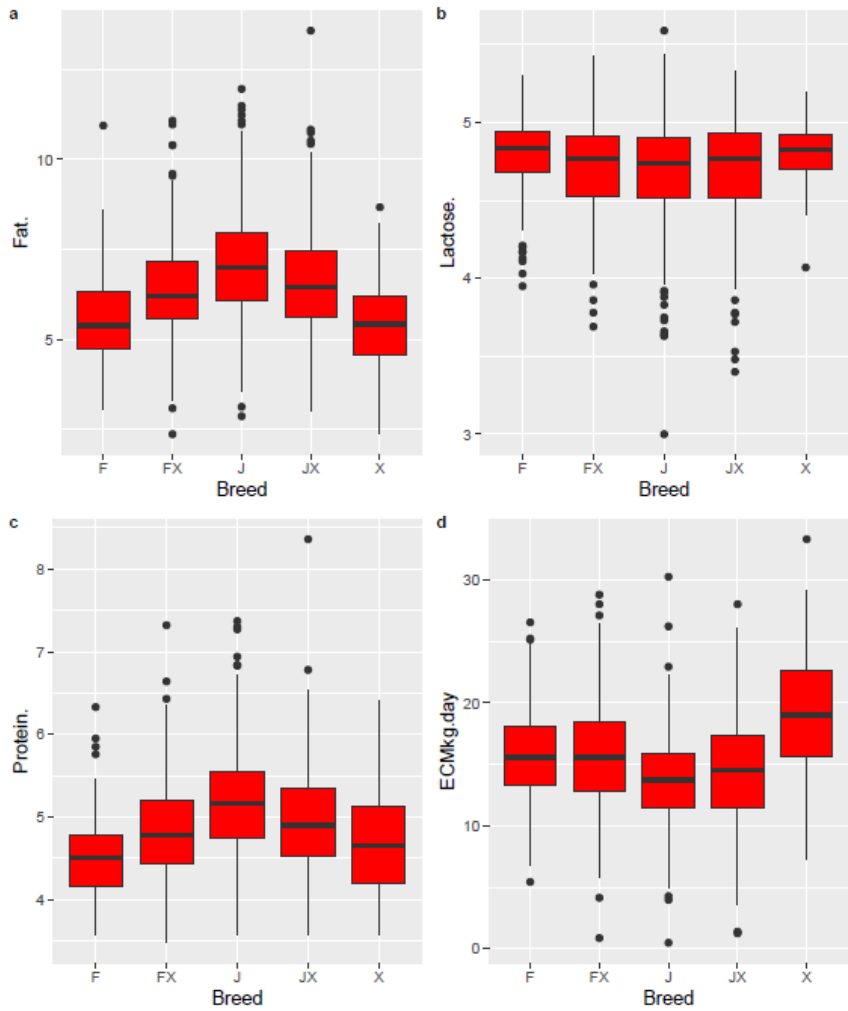


Figure 29: Summary of all cows in herd test 4, Cow breed (Friesian (F), Friesian cross (FX), Jersey (J), Jersey cross (JX), Crossbred (X), and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

## Milk Production by herd

Herd A

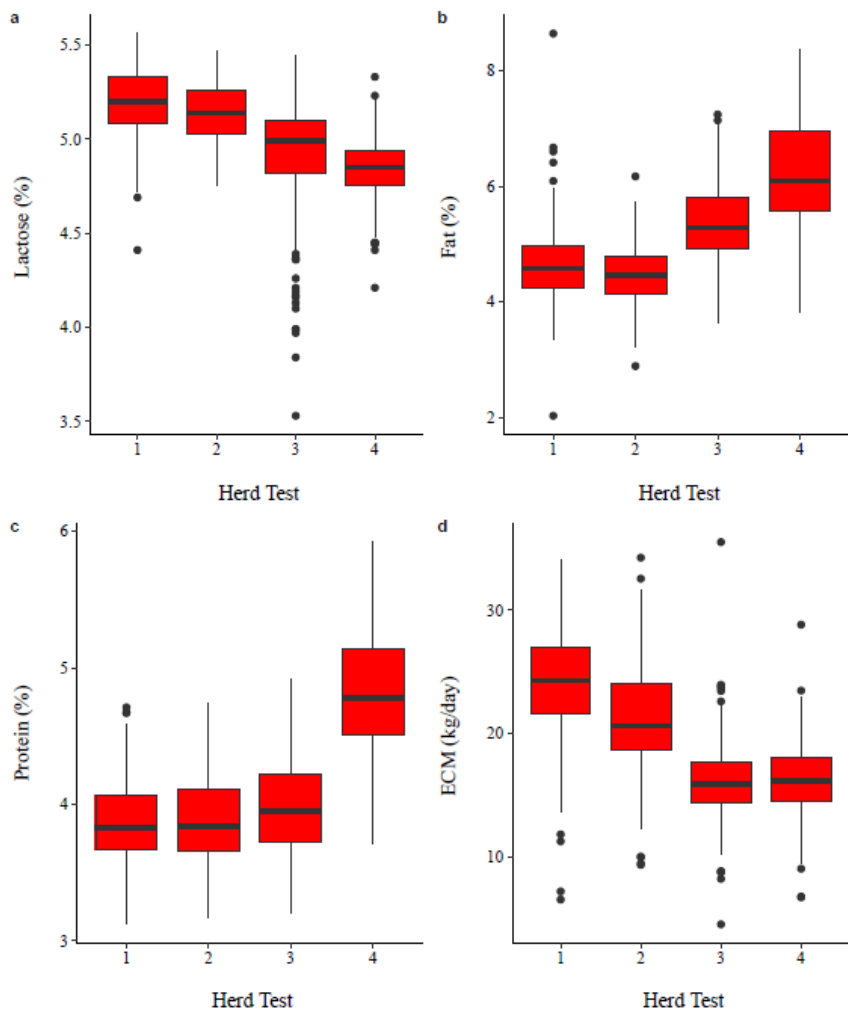


Figure 21: Summary of all herd tests for Herd A and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

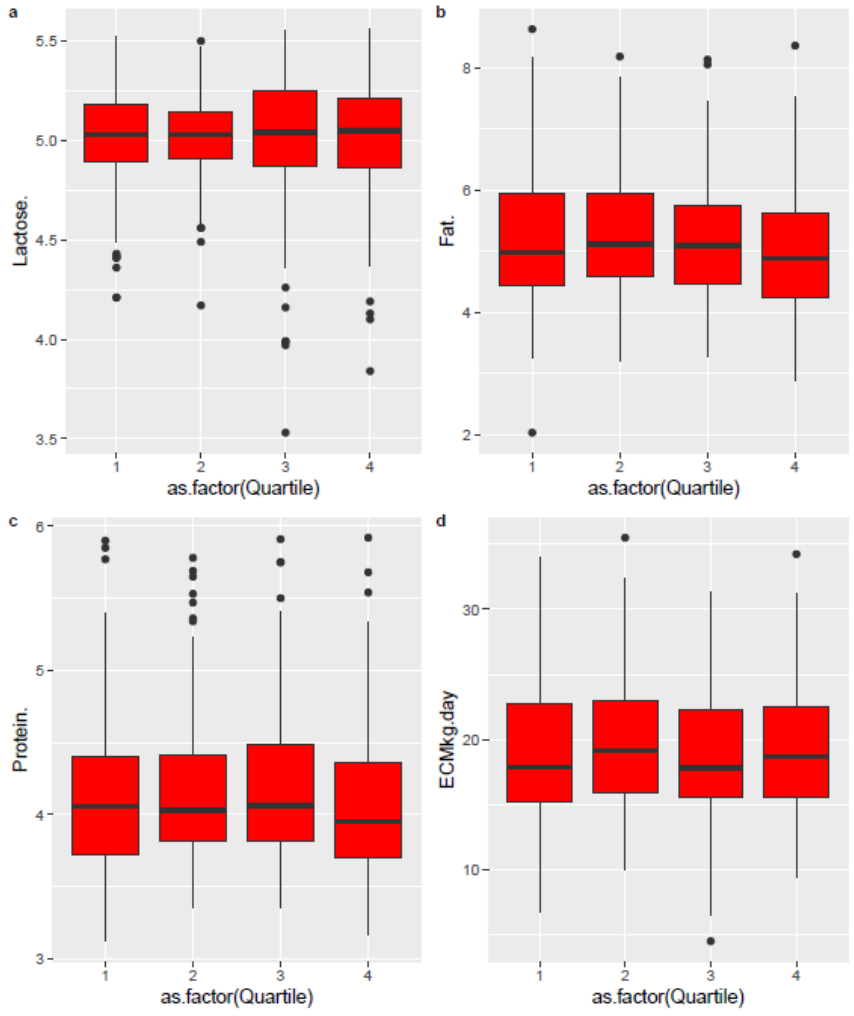


Figure 22: Summary of all herd tests for Herd A, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

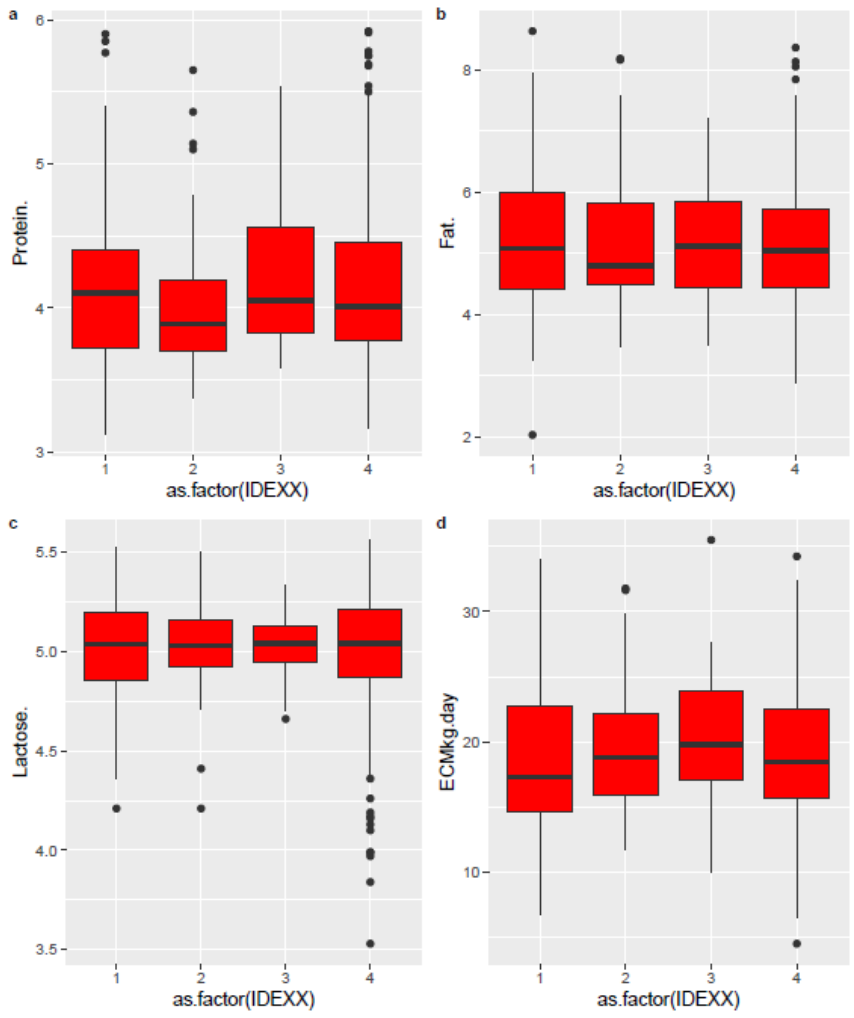


Figure 23: Summary of all herd tests for Herd A, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

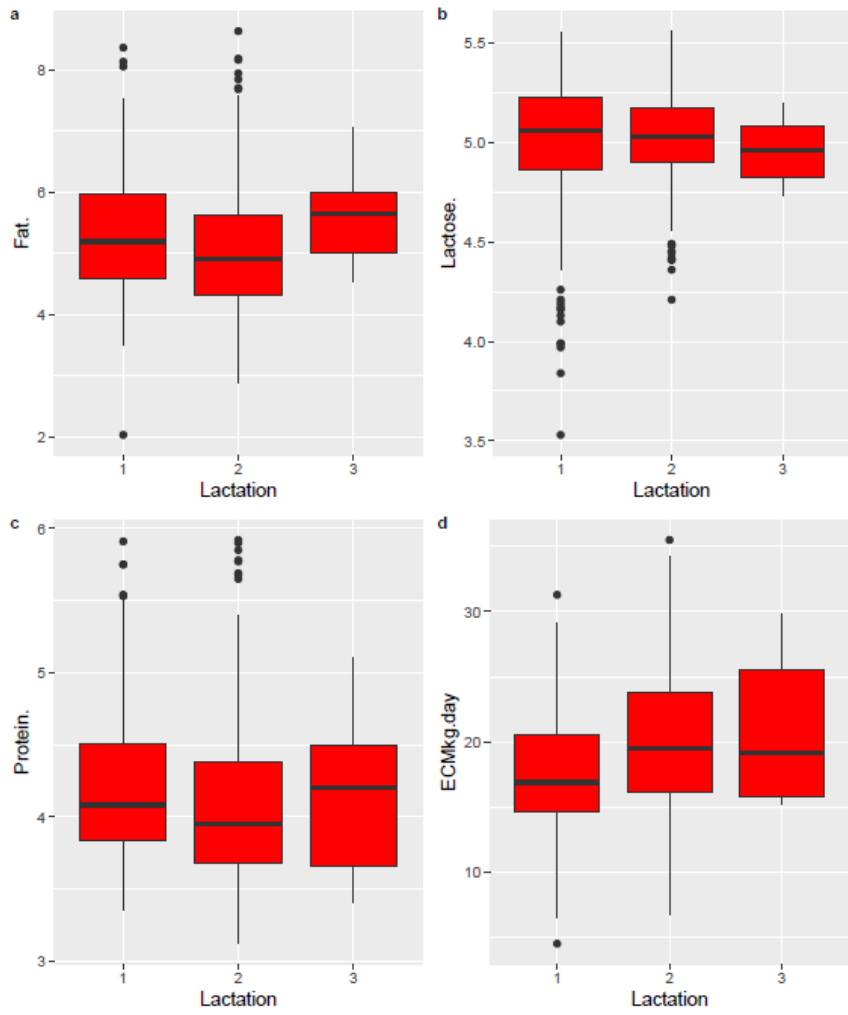


Figure 24; Summary of all herd tests for Herd A, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd B

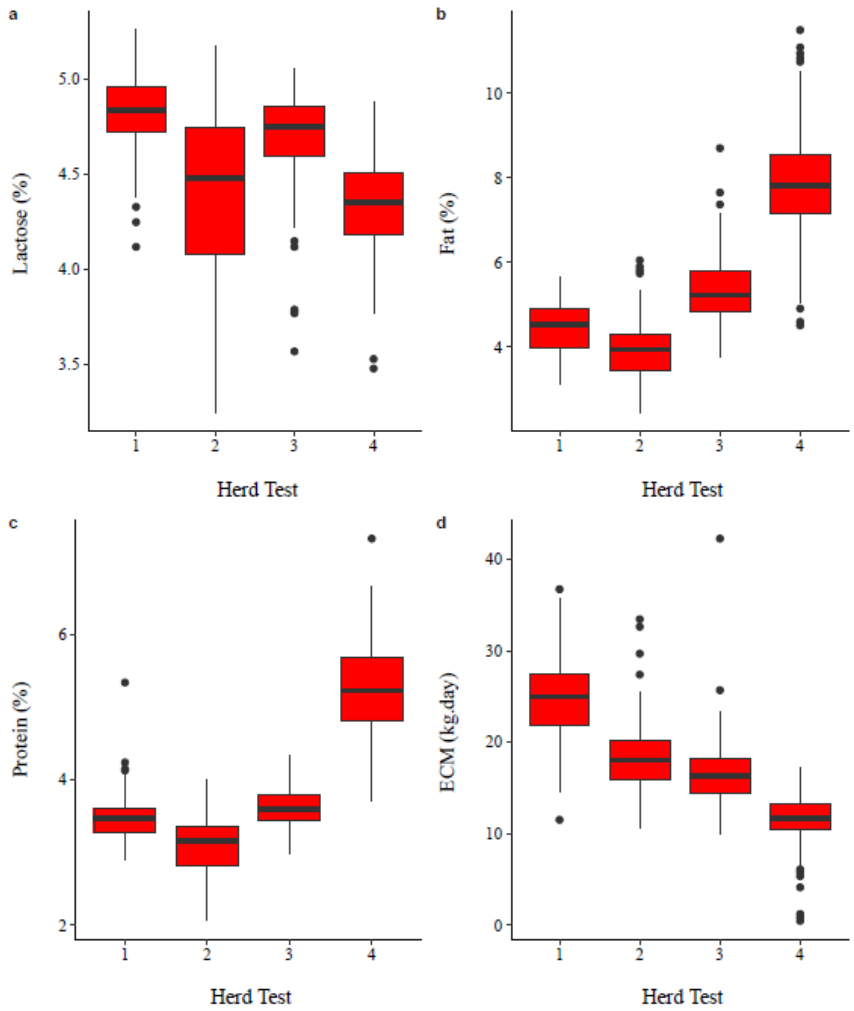


Figure 25; Summary of all herd tests for Herd B and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

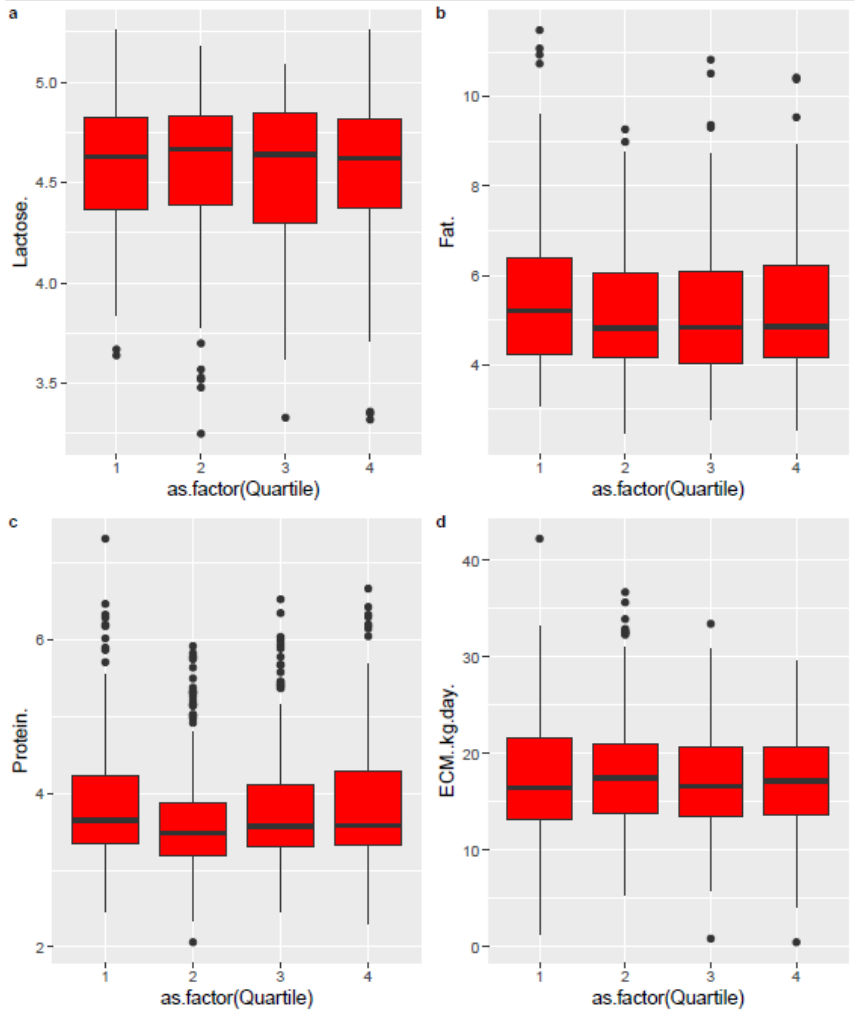


Figure 26: Summary of all herd tests for Herd B, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

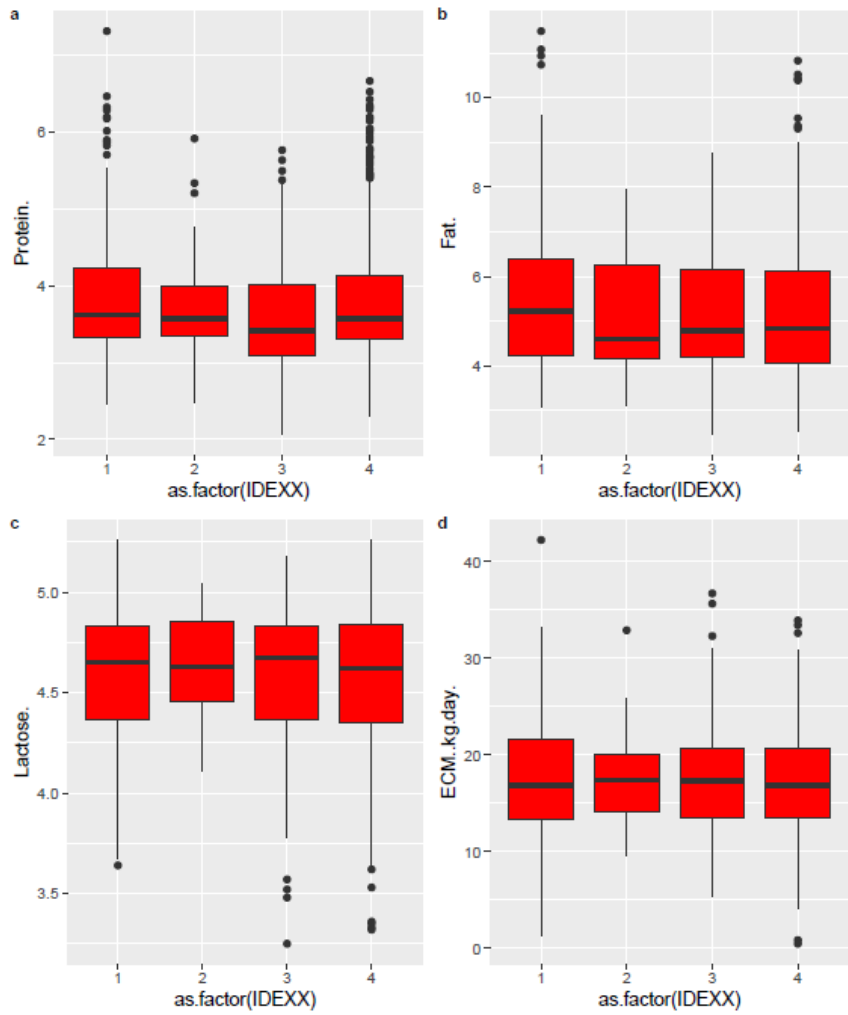


Figure 27: Summary of all herd tests for Herd B, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

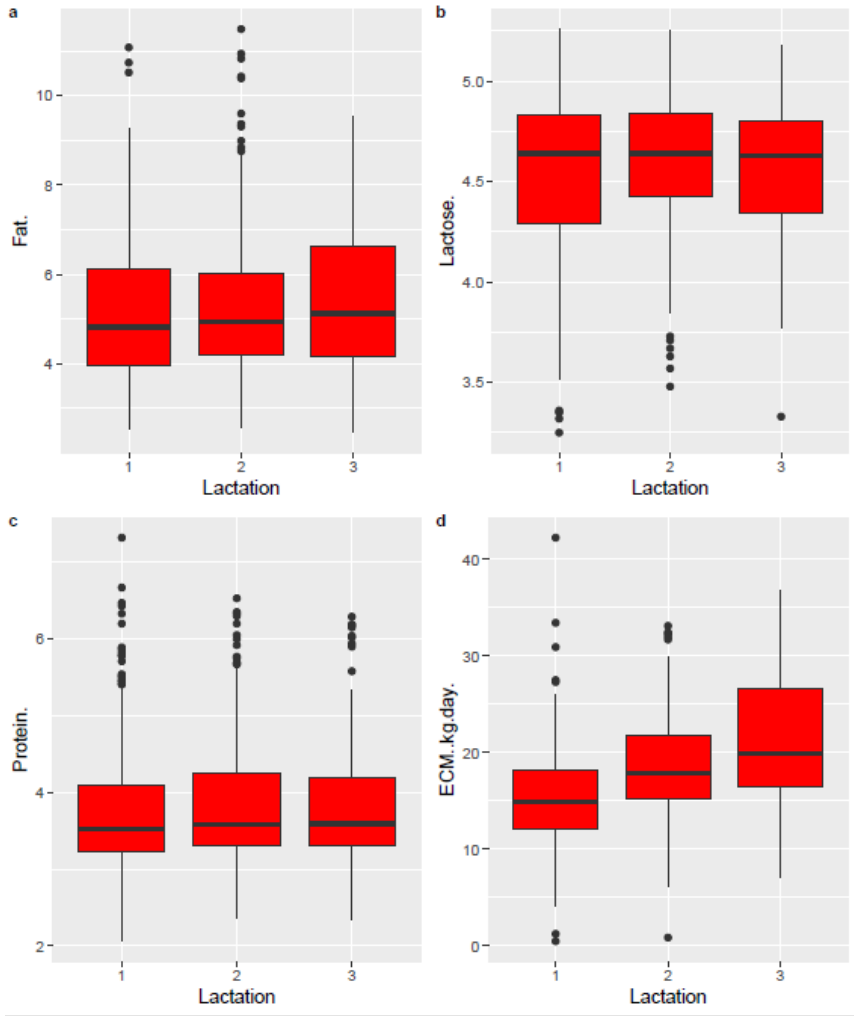


Figure 28: Summary of all herd tests for Herd B, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd C

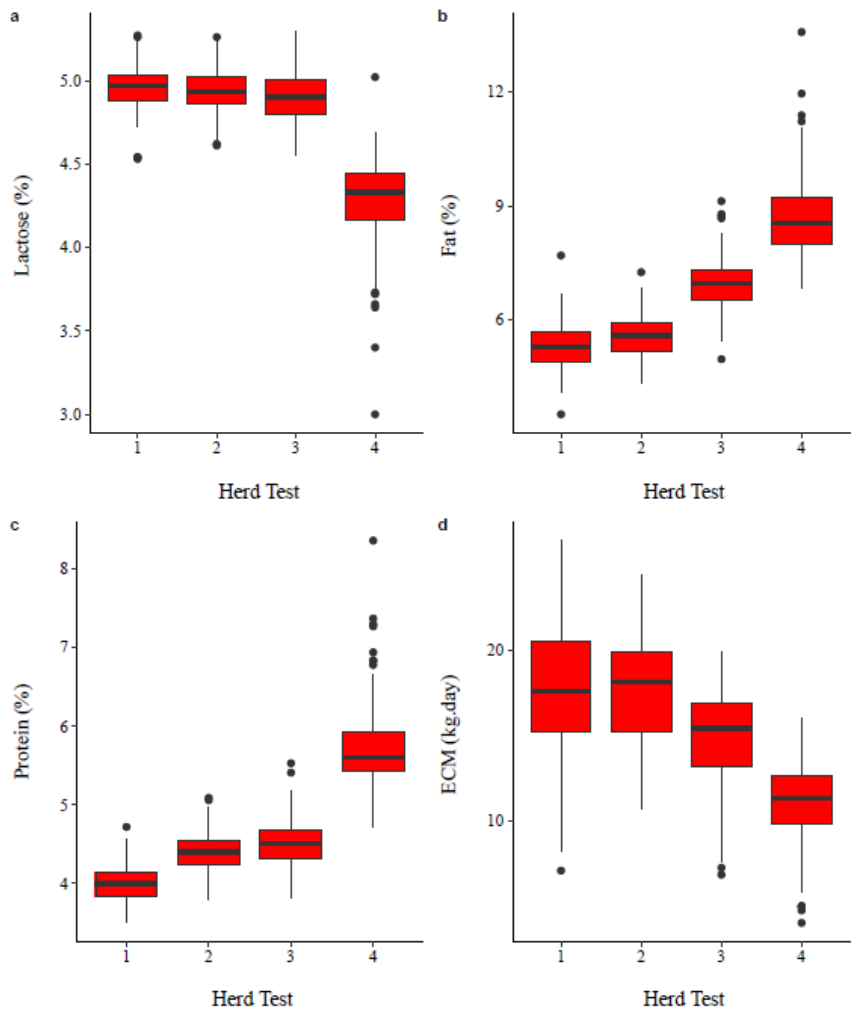


Figure 29: Summary of all herd tests for Herd C and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

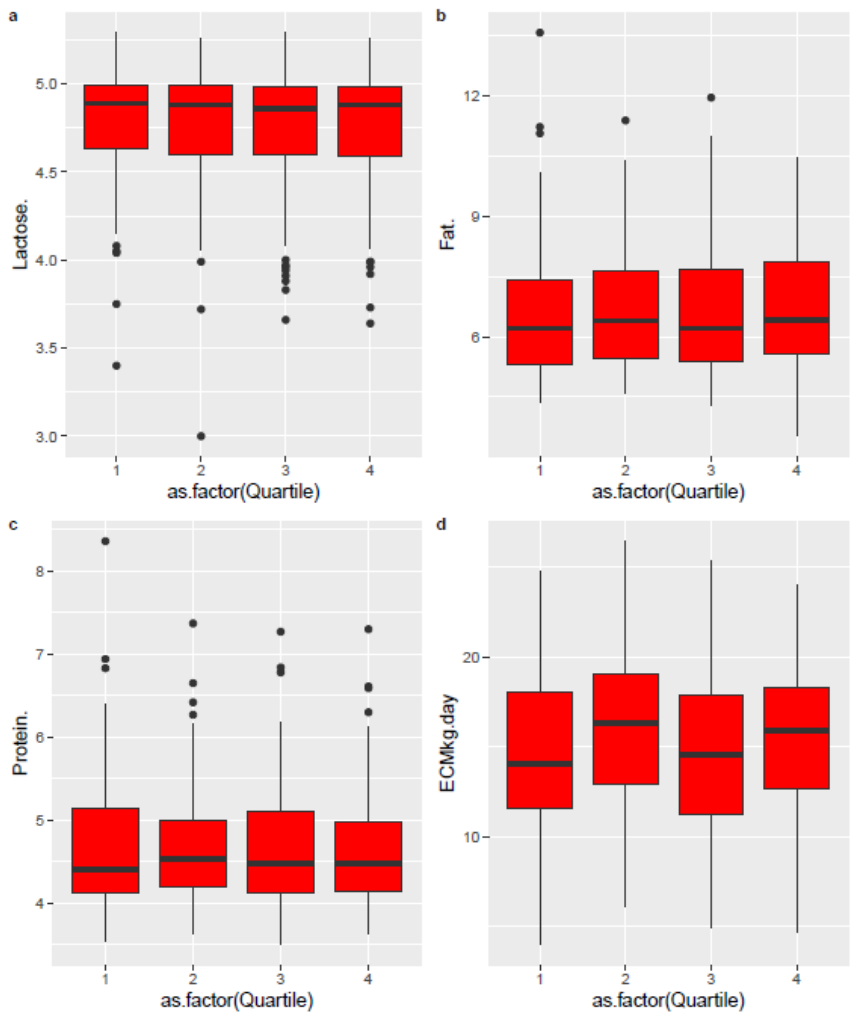


Figure 30: Summary of all herd tests for Herd C, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

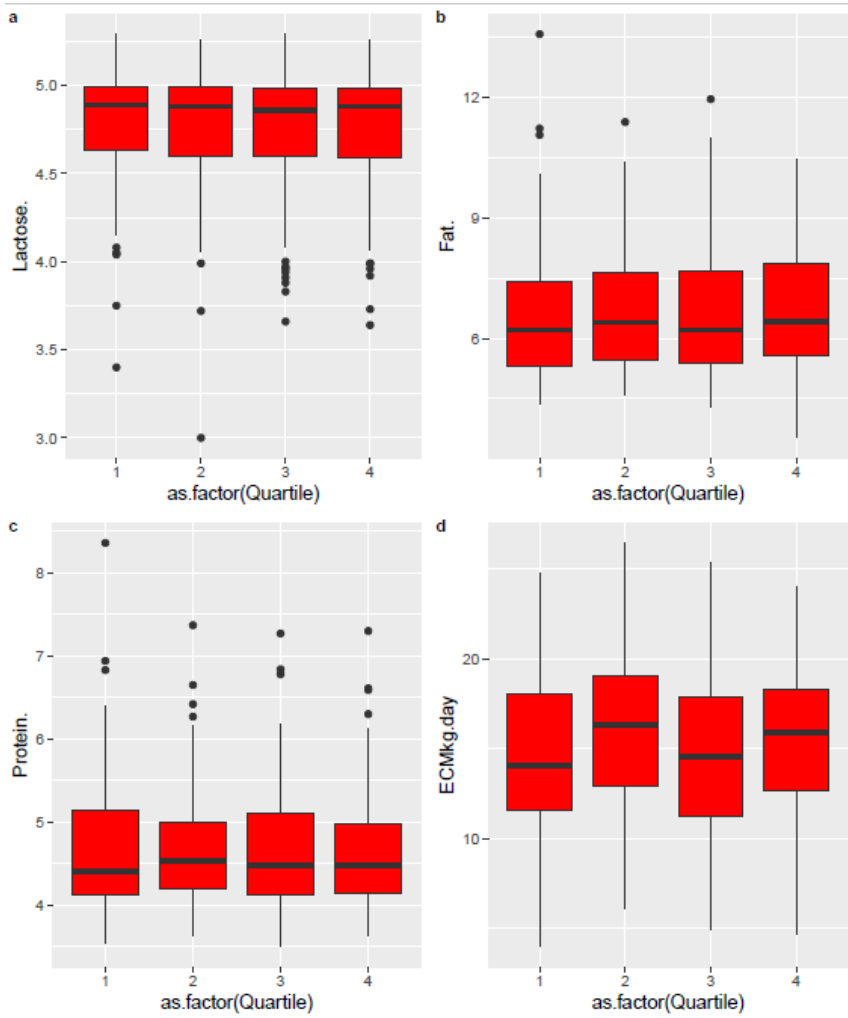


Figure 31: Summary of all herd tests for Herd C, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

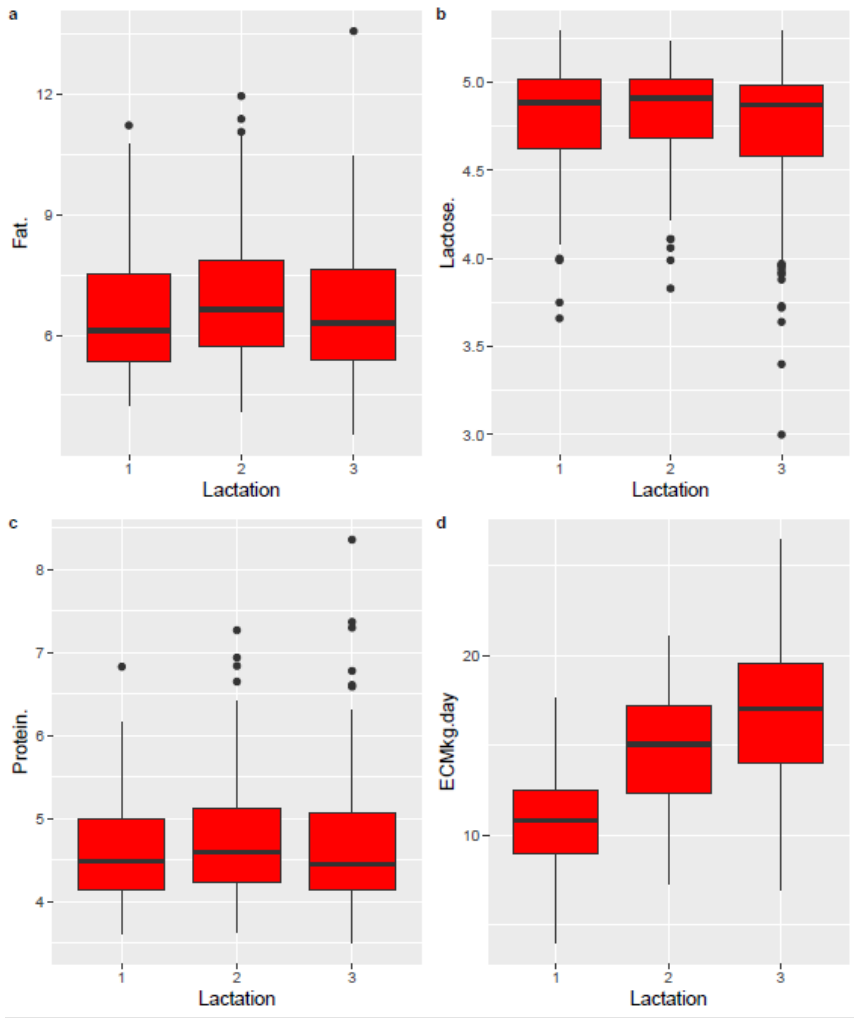


Figure 32: Summary of all herd tests for Herd C, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

### Herd D

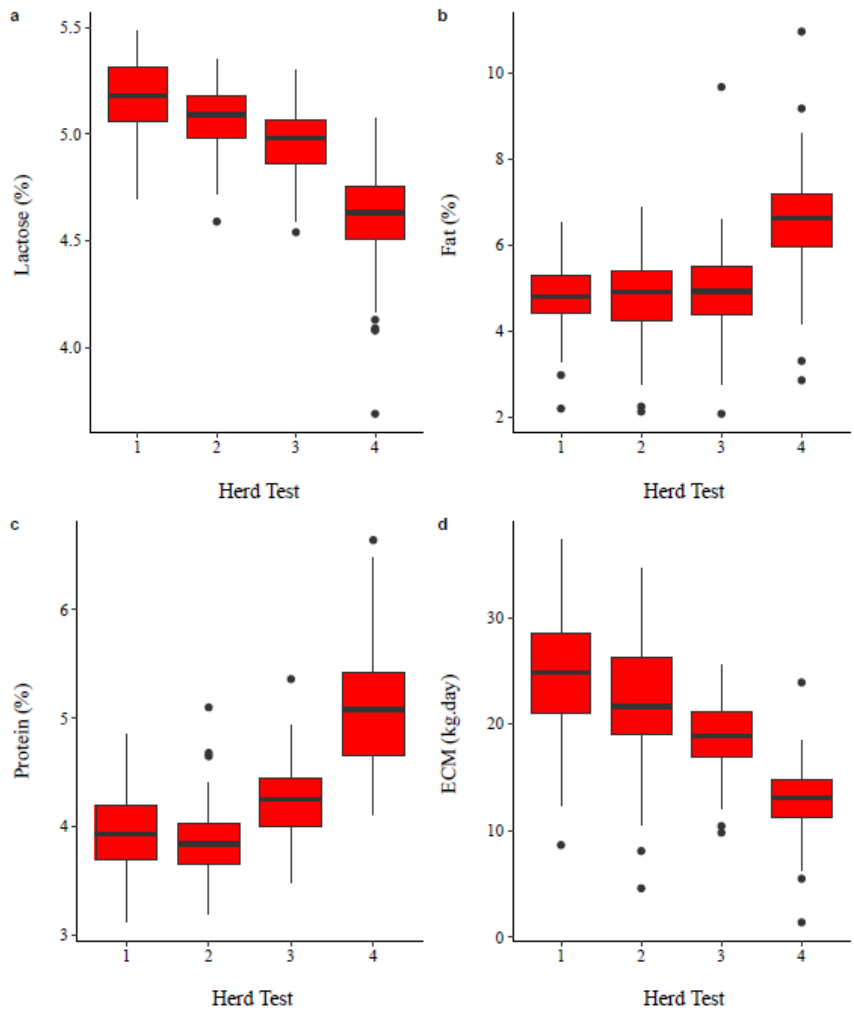


Figure 33: Summary of all herd tests for Herd D and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

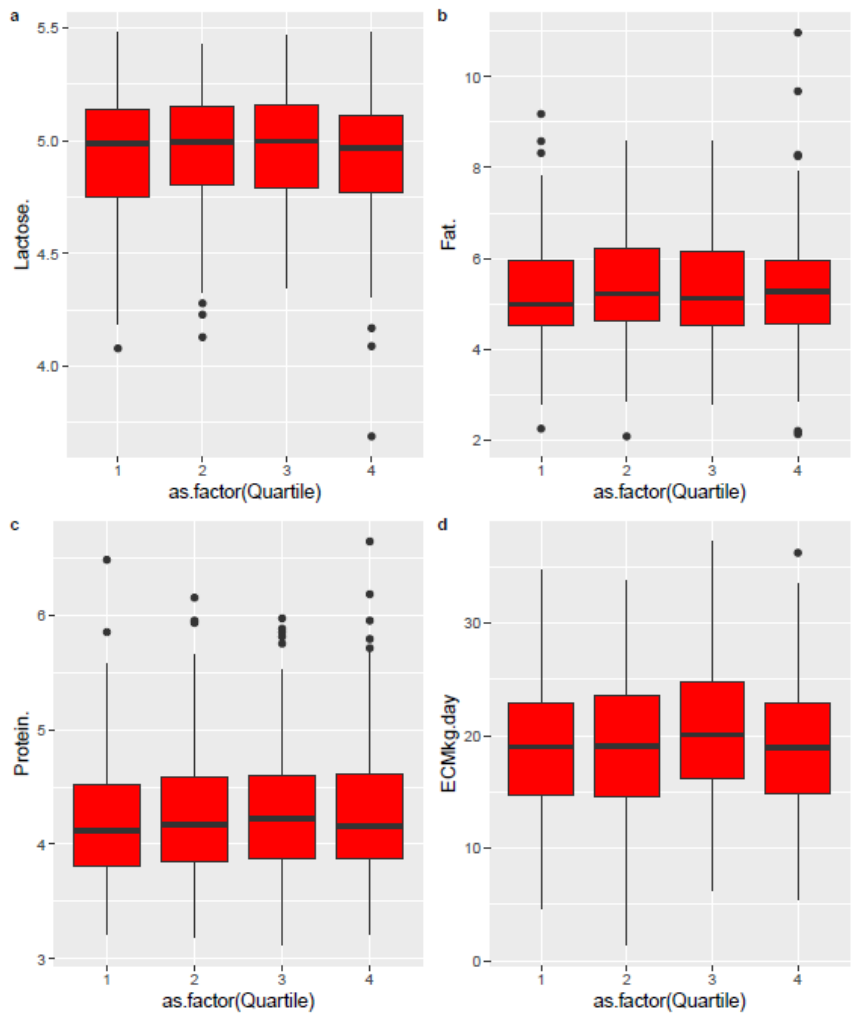


Figure 34: Summary of all herd tests for Herd D, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

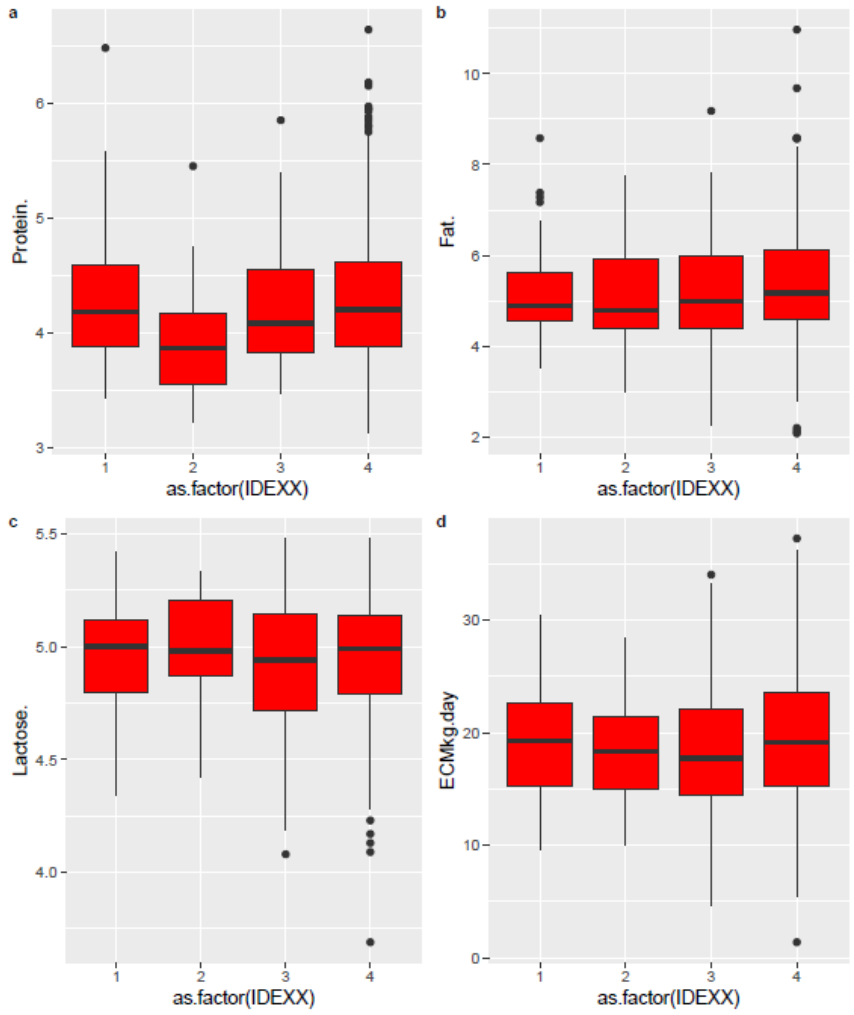


Figure 35: Summary of all herd tests for Herd D, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

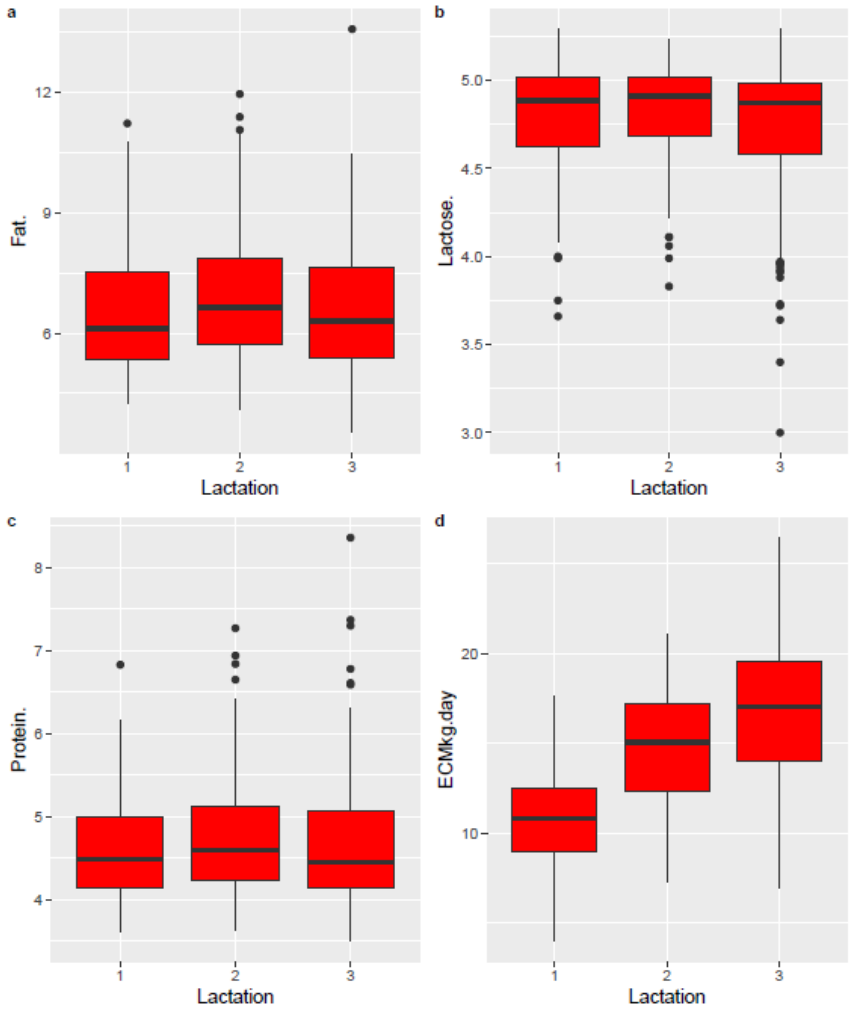


Figure 36: Summary of all herd tests for Herd D, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd E

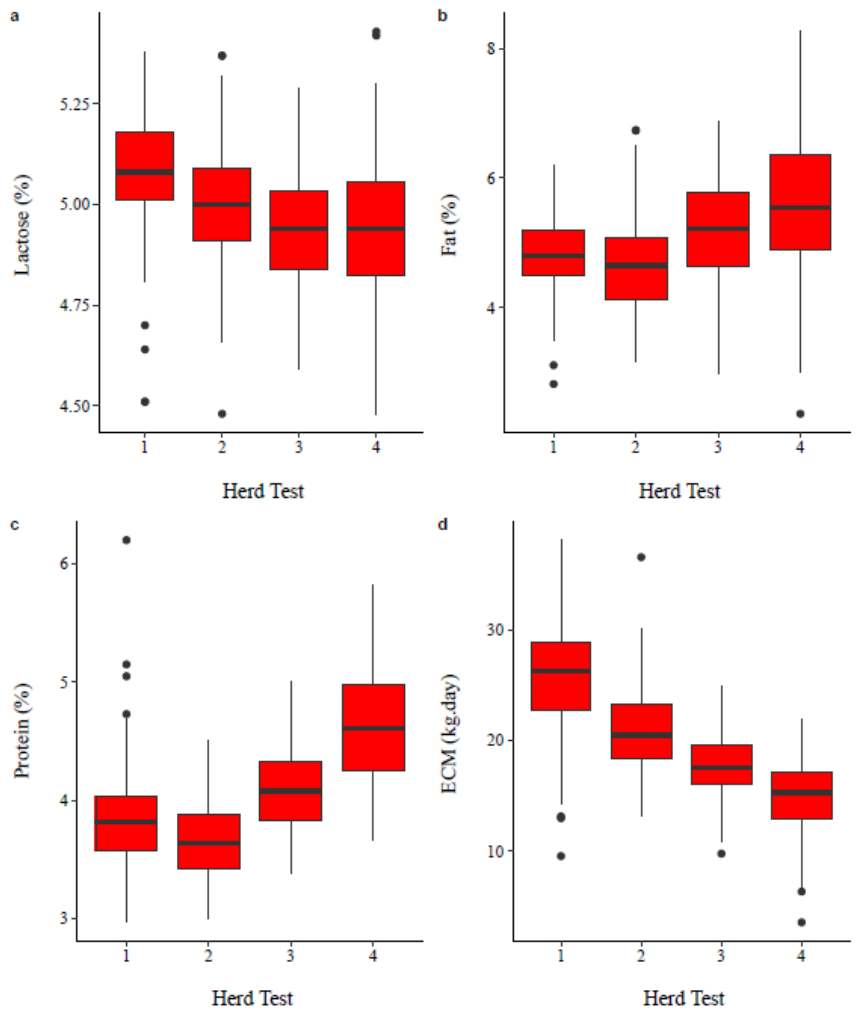


Figure 37: Summary of all herd tests for Herd E and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

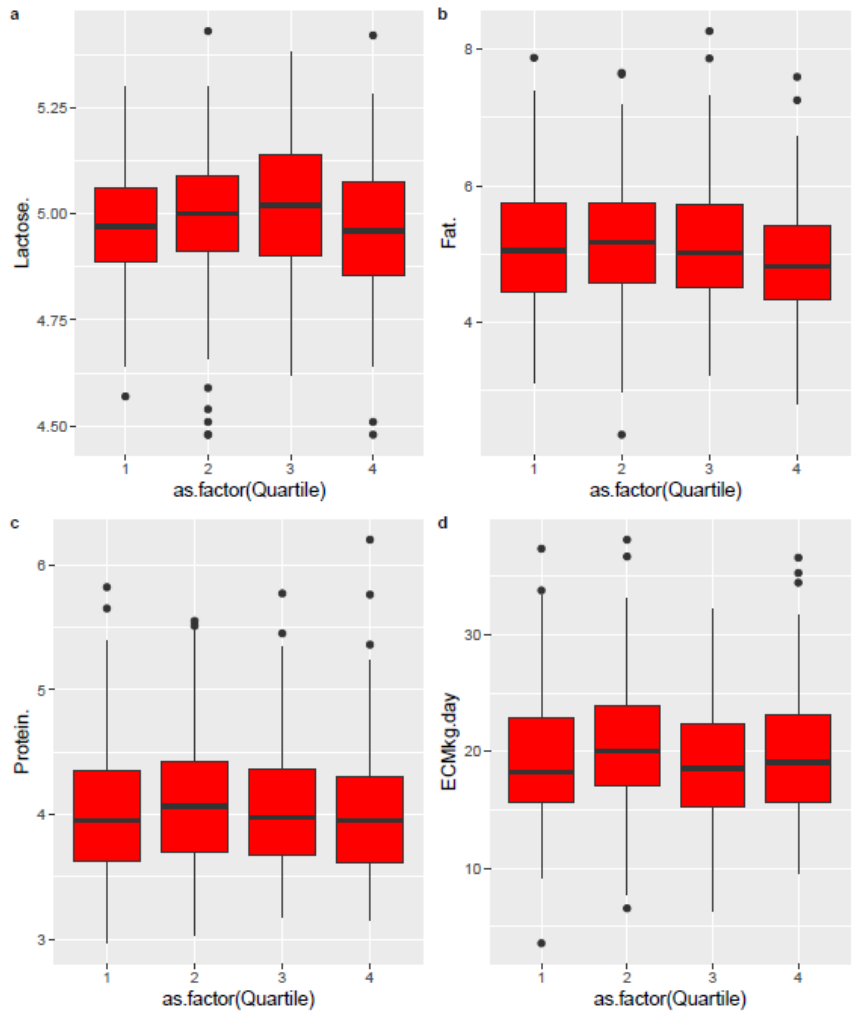


Figure 38: Summary of all herd tests for Herd E, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

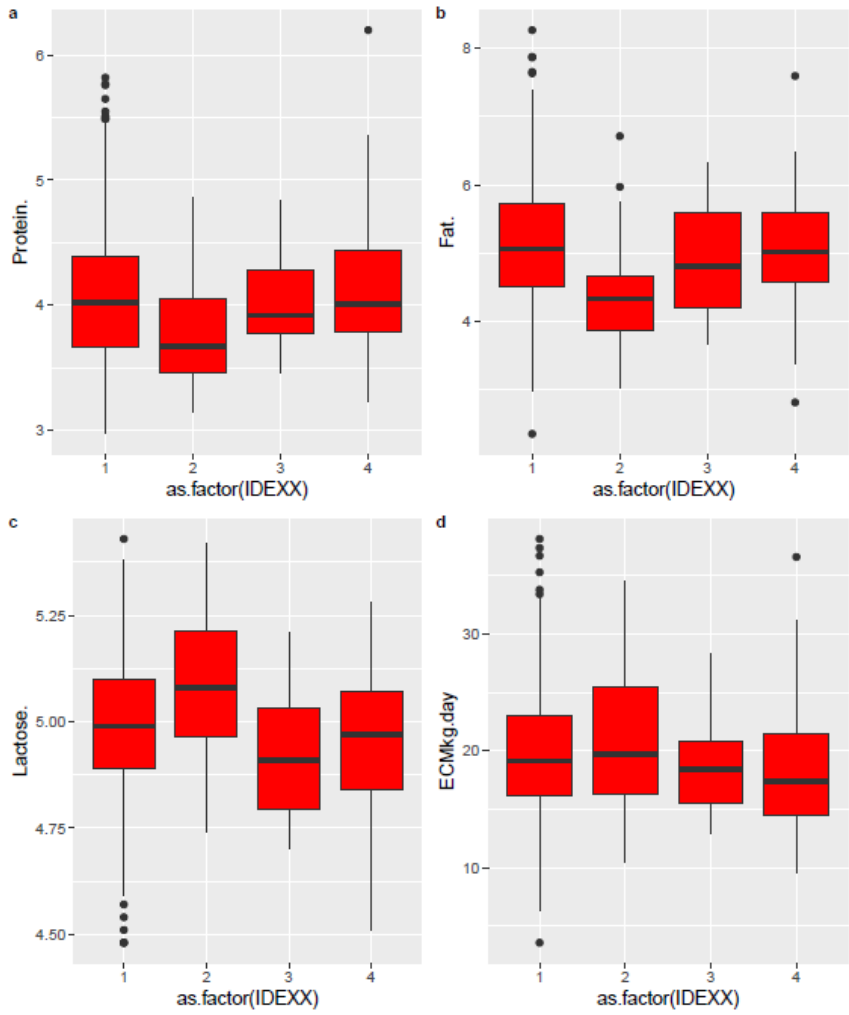


Figure 39: Summary of all herd tests for Herd E, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

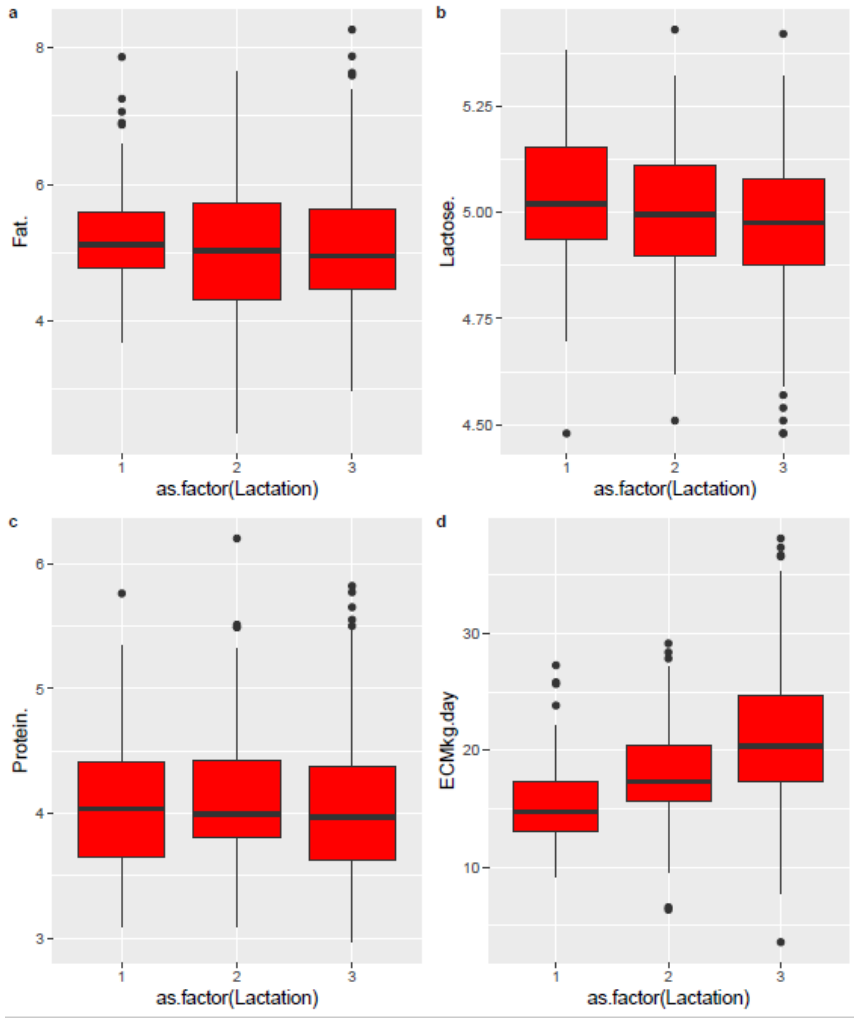


Figure 40: Summary of all herd tests for Herd E, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd F

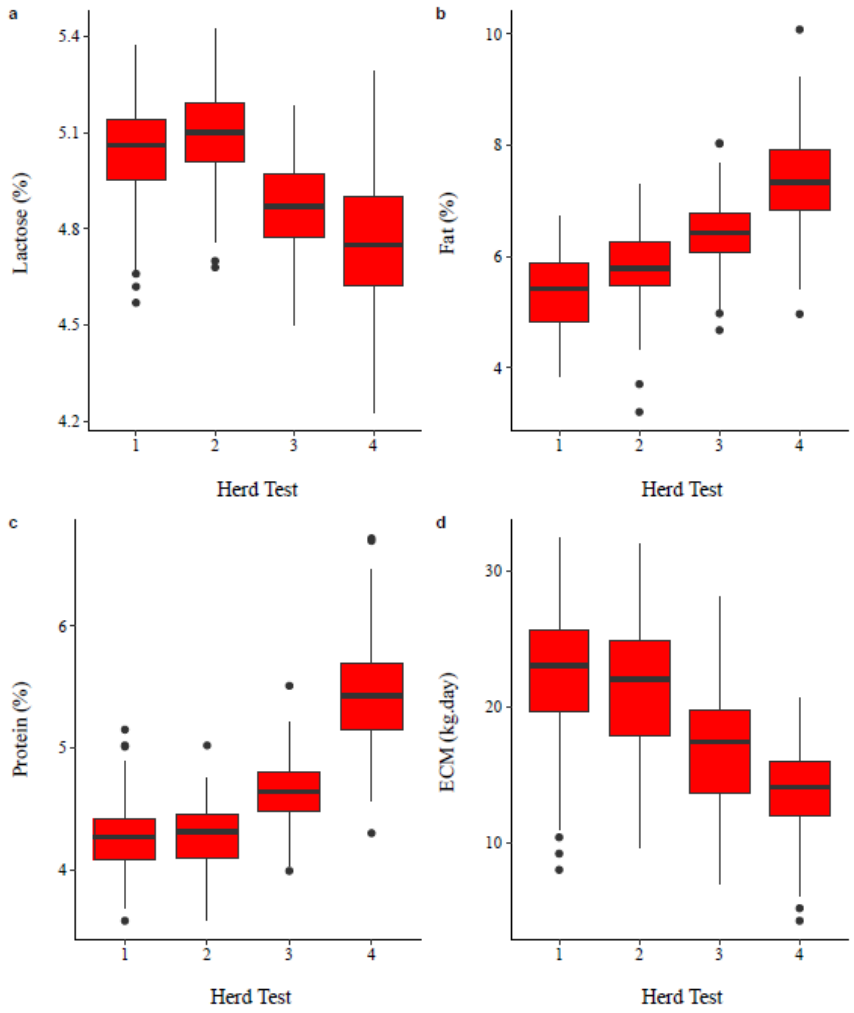


Figure 41: Summary of all herd tests for Herd F and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

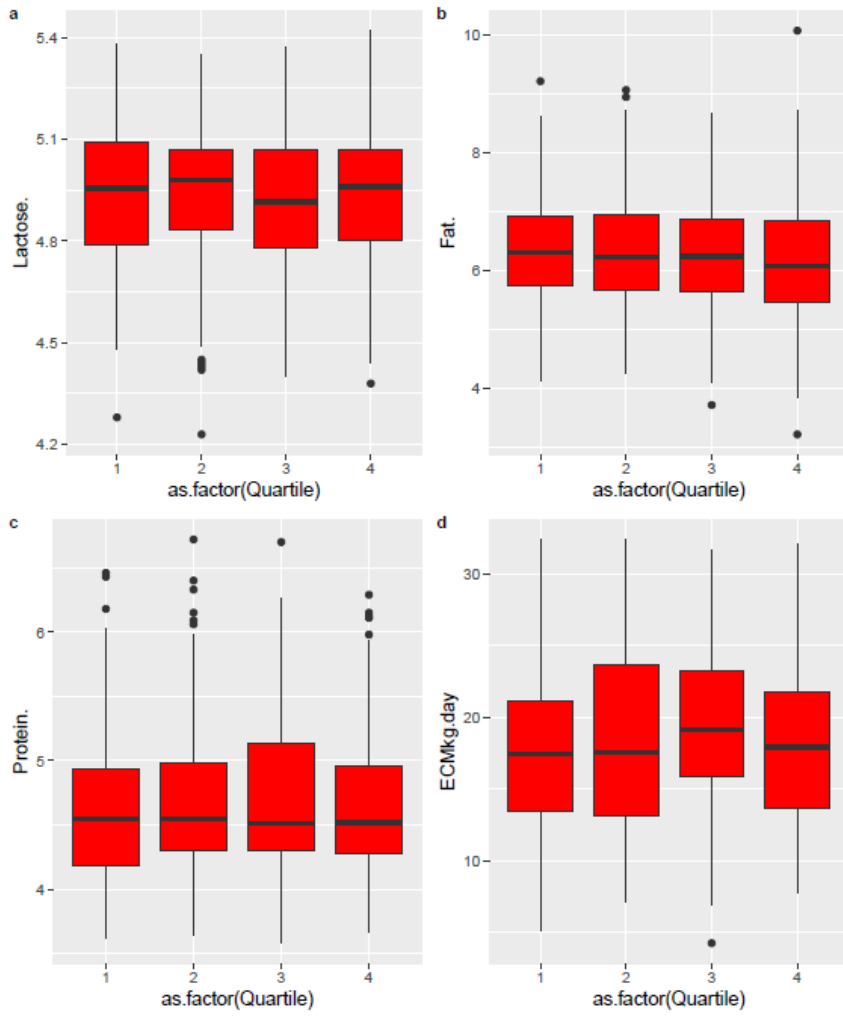


Figure 42: Summary of all herd tests for Herd F, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

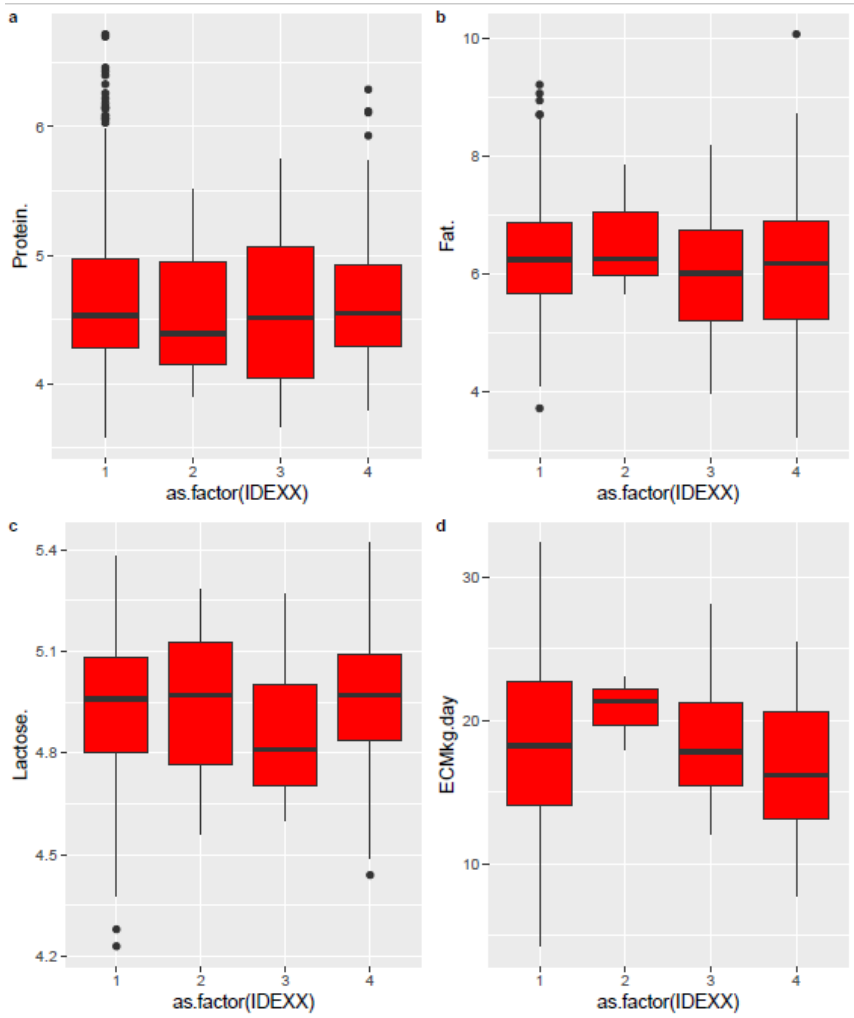


Figure 43: Summary of all herd tests for Herd F, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

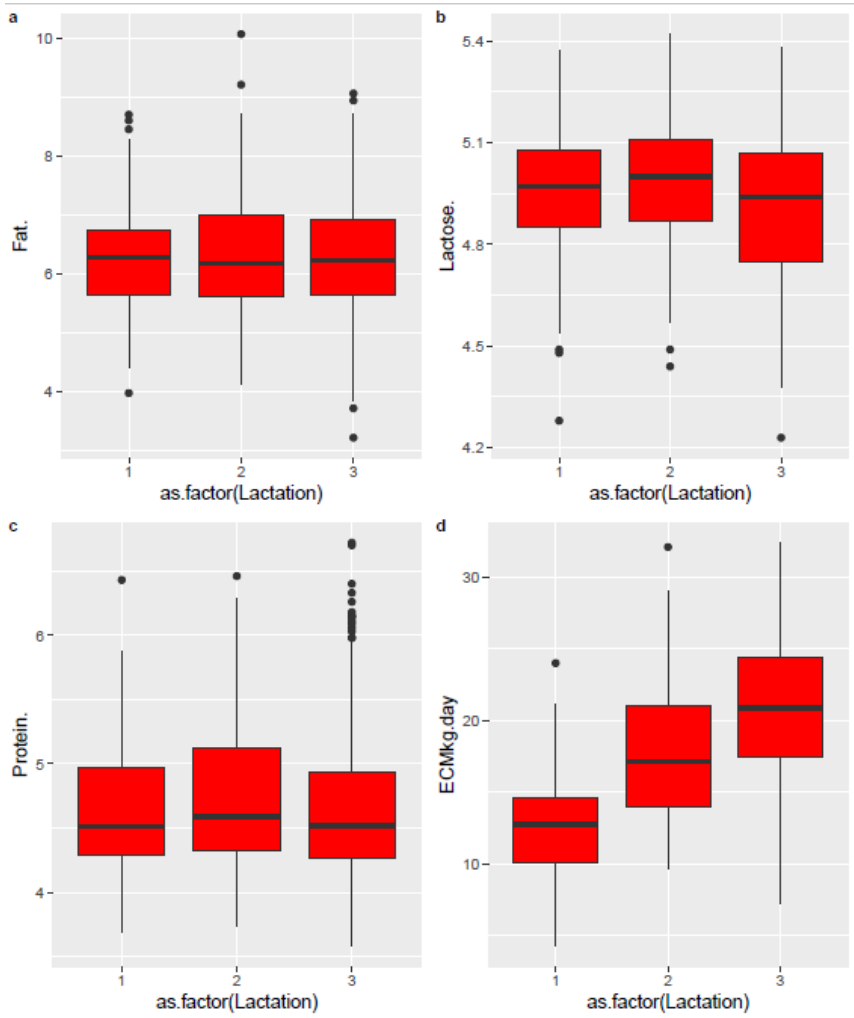


Figure 44: Summary of all herd tests for Herd F, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

## Herd G

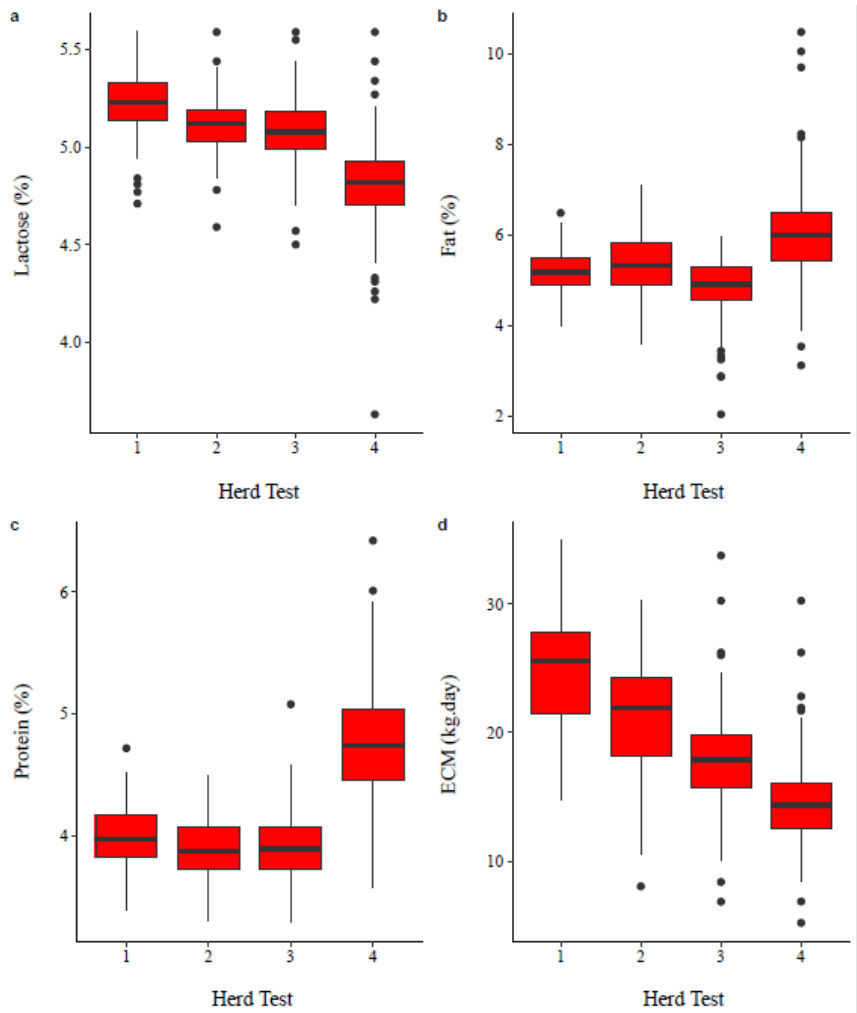


Figure 45: Summary of all herd tests for Herd G and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

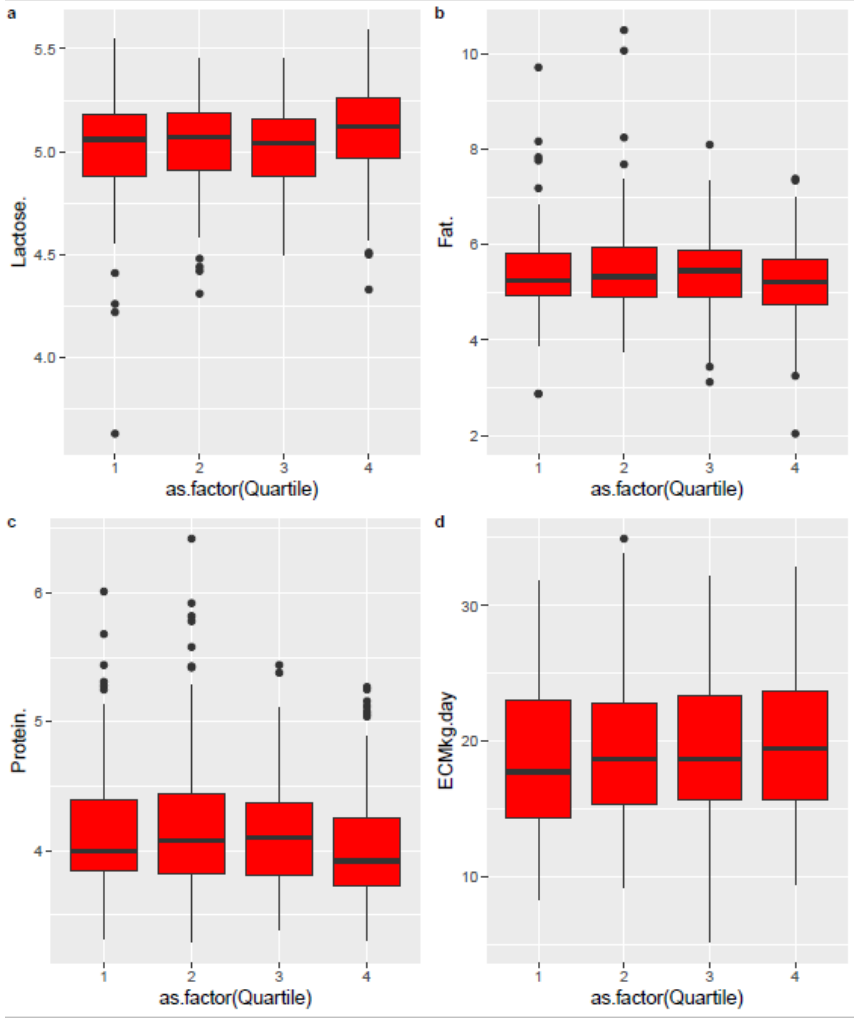


Figure 46: Summary of all herd tests for Herd G, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

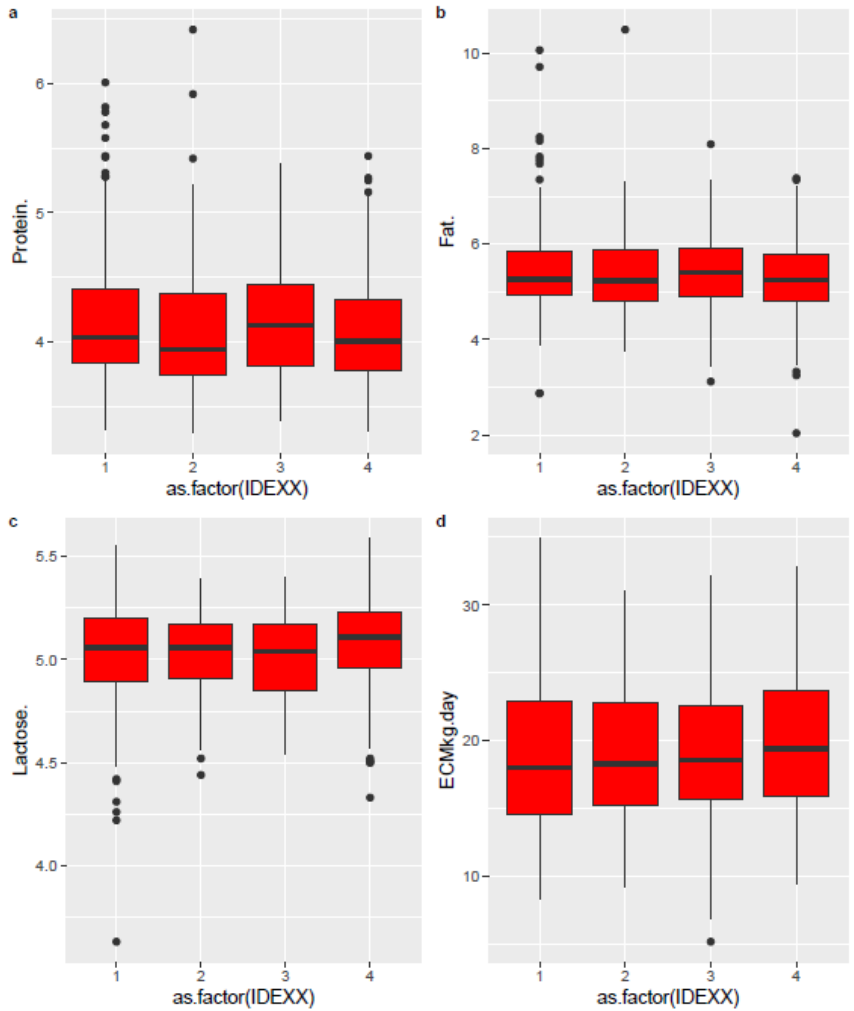


Figure 47: Summary of all herd tests for Herd G, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

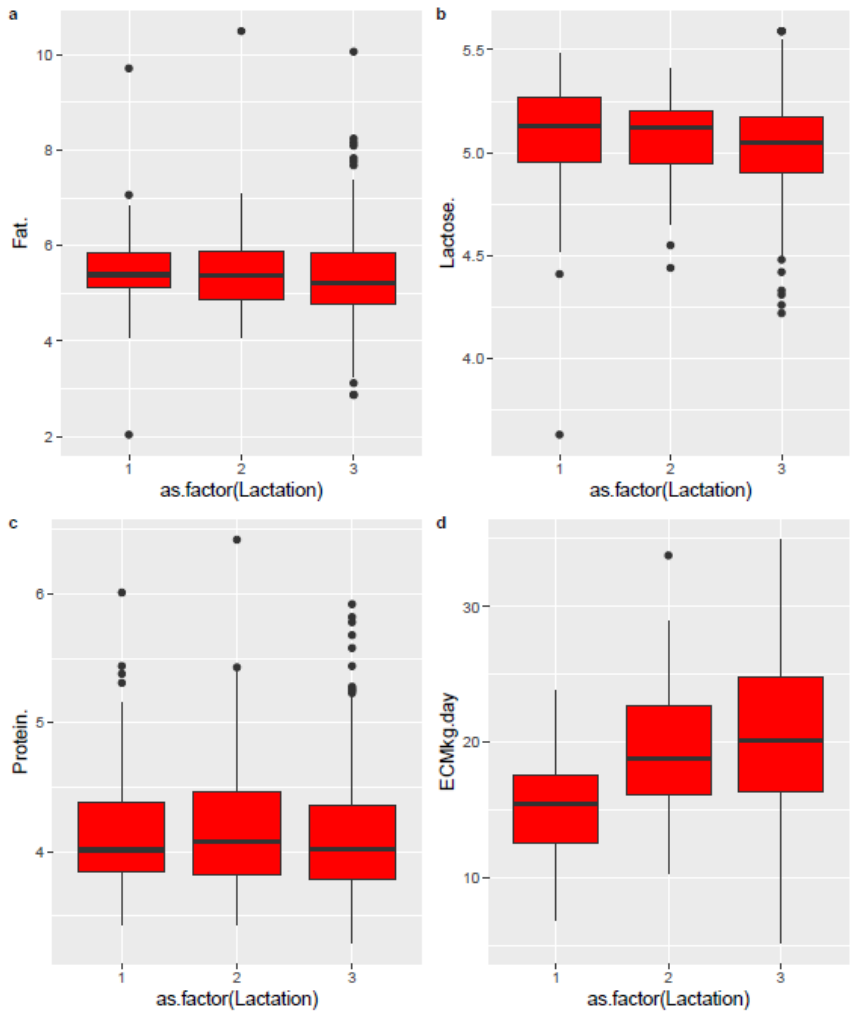


Figure 48: Summary of all herd tests for Herd G, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd I

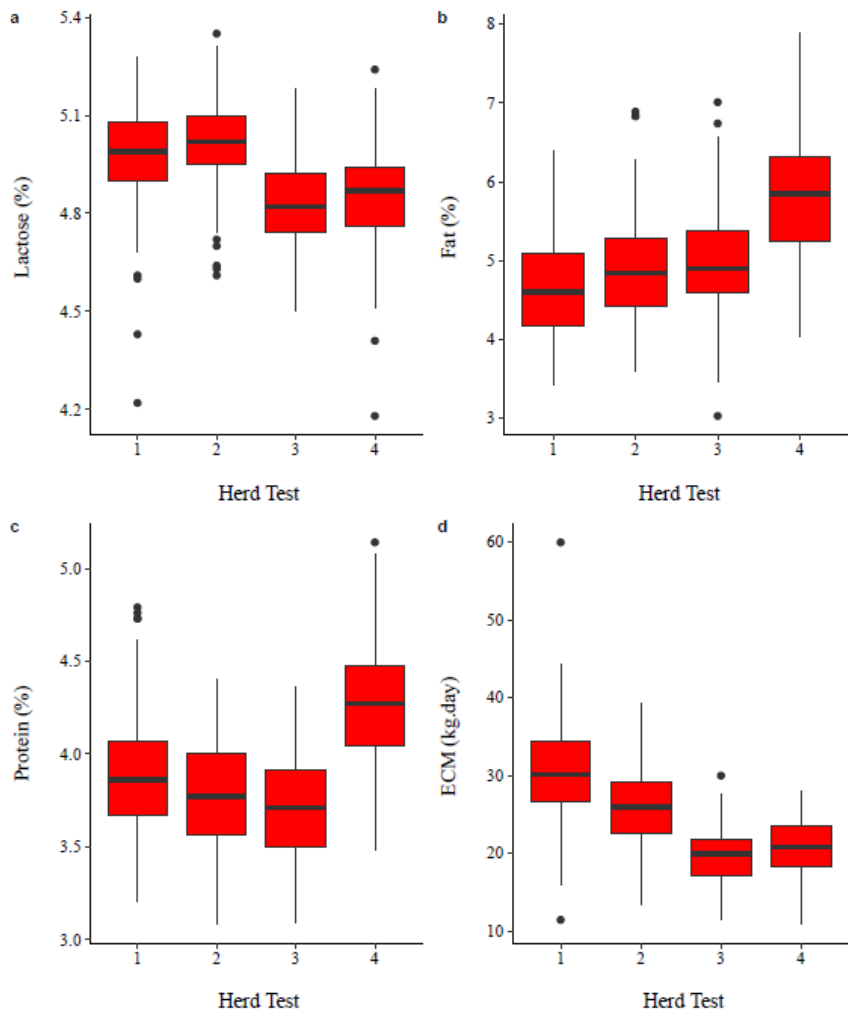


Figure 49: Summary of all herd tests for Herd I and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

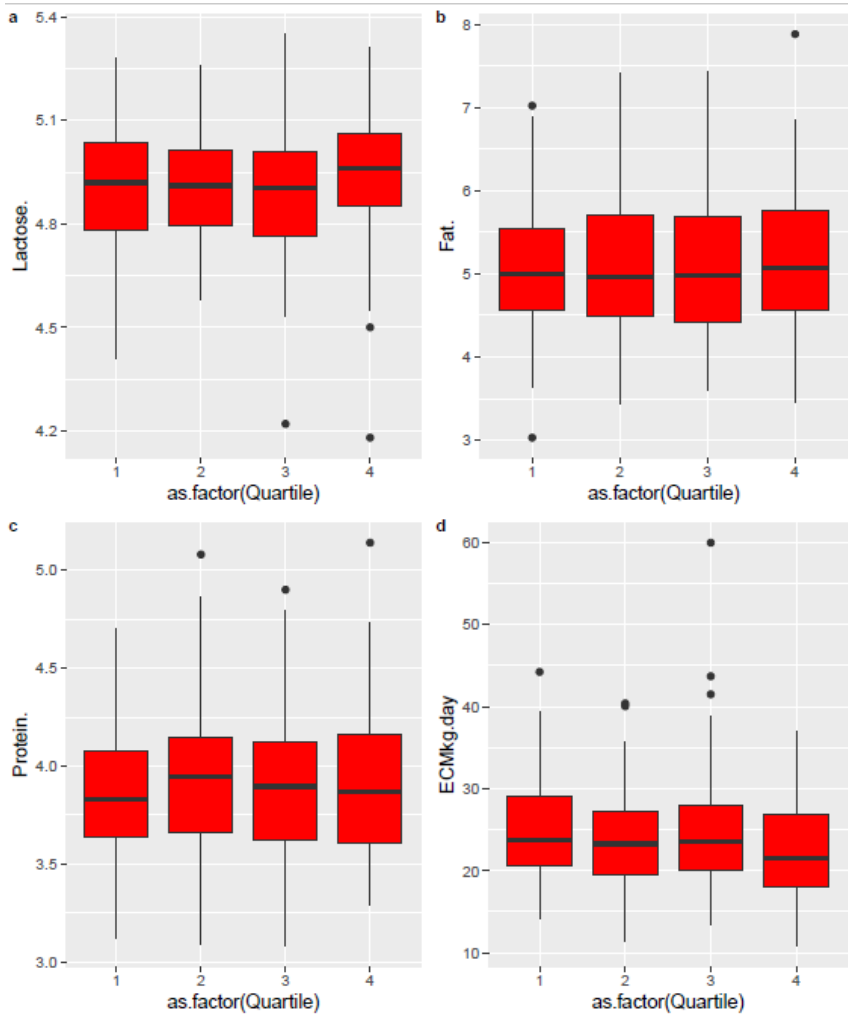


Figure 50: Summary of all herd tests for Herd I, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

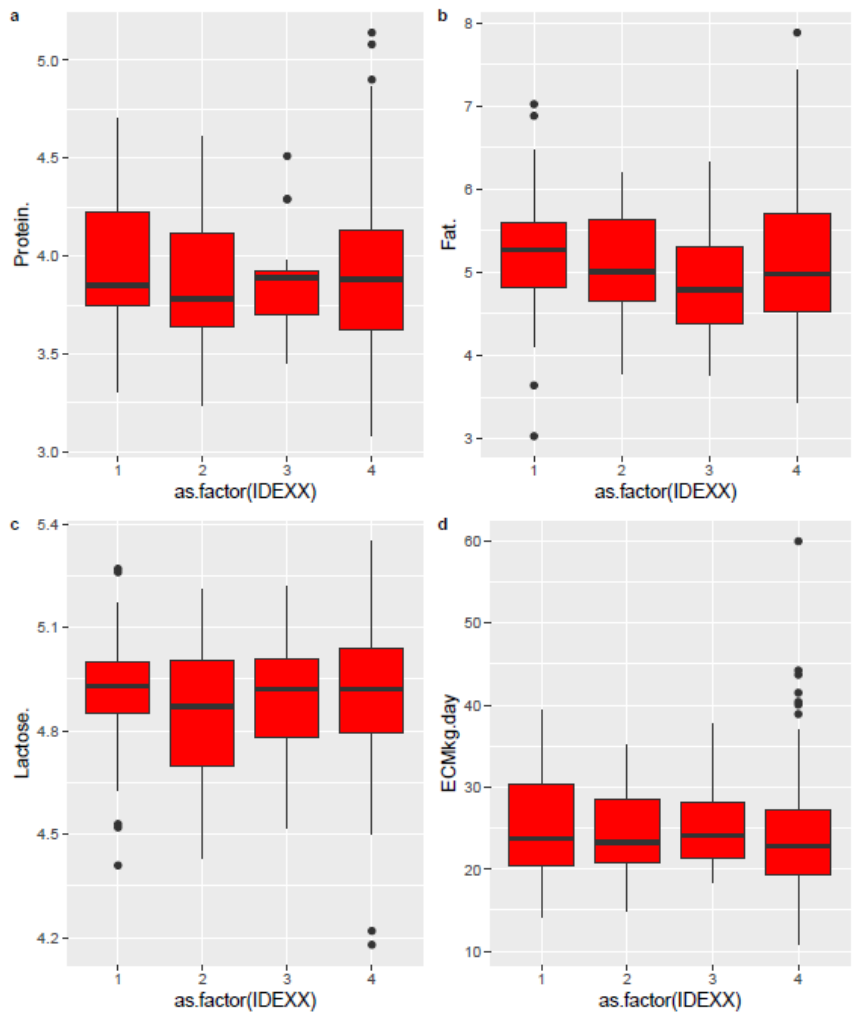


Figure 51: Summary of all herd tests for Herd 1, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

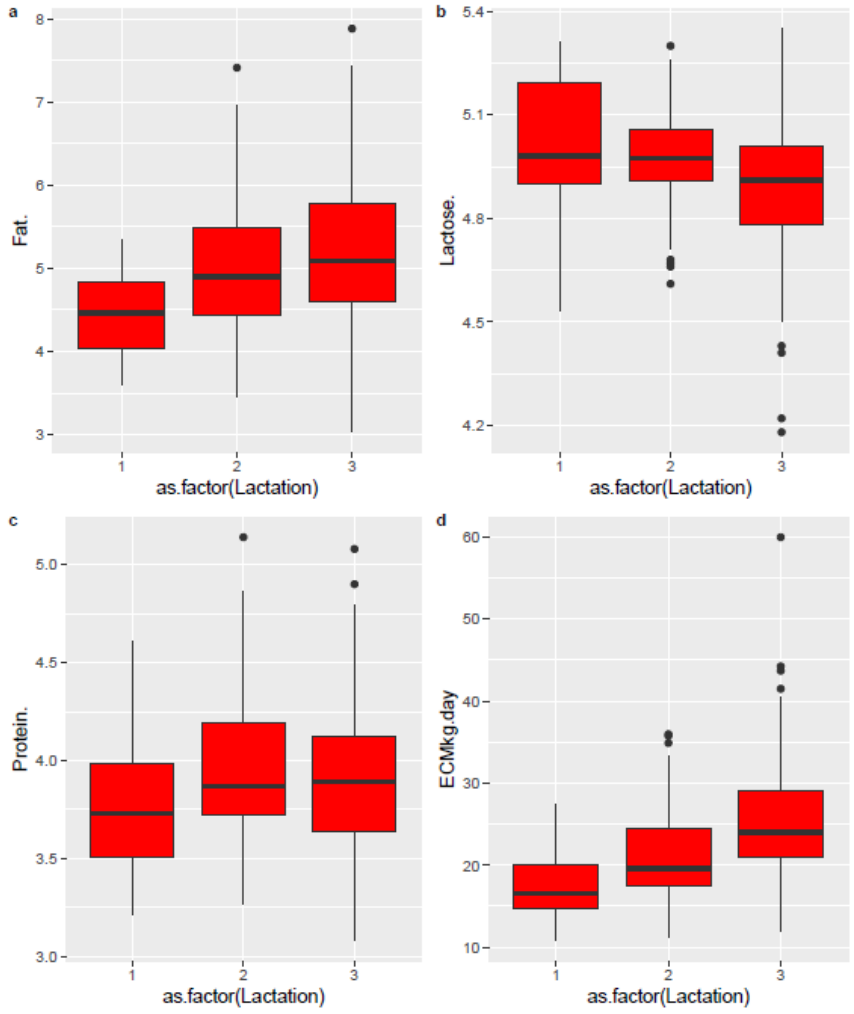


Figure 52: Summary of all herd tests for Herd I, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd J

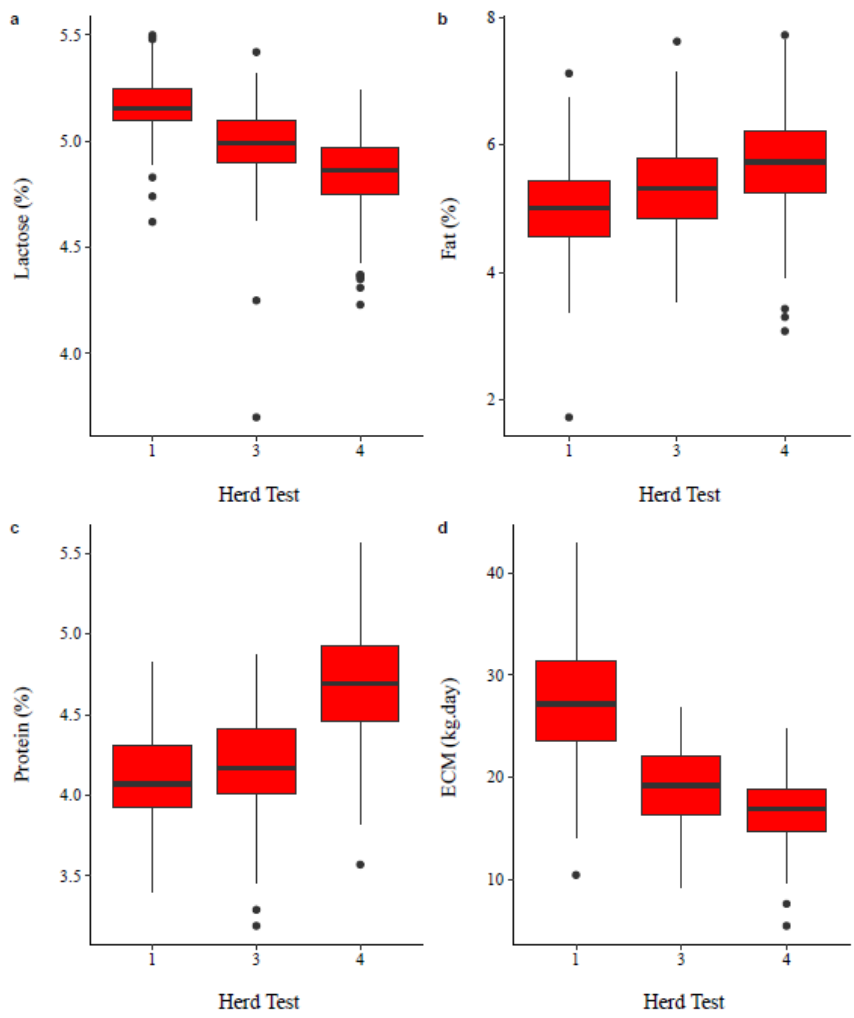


Figure 53: Summary of all herd tests for Herd J and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

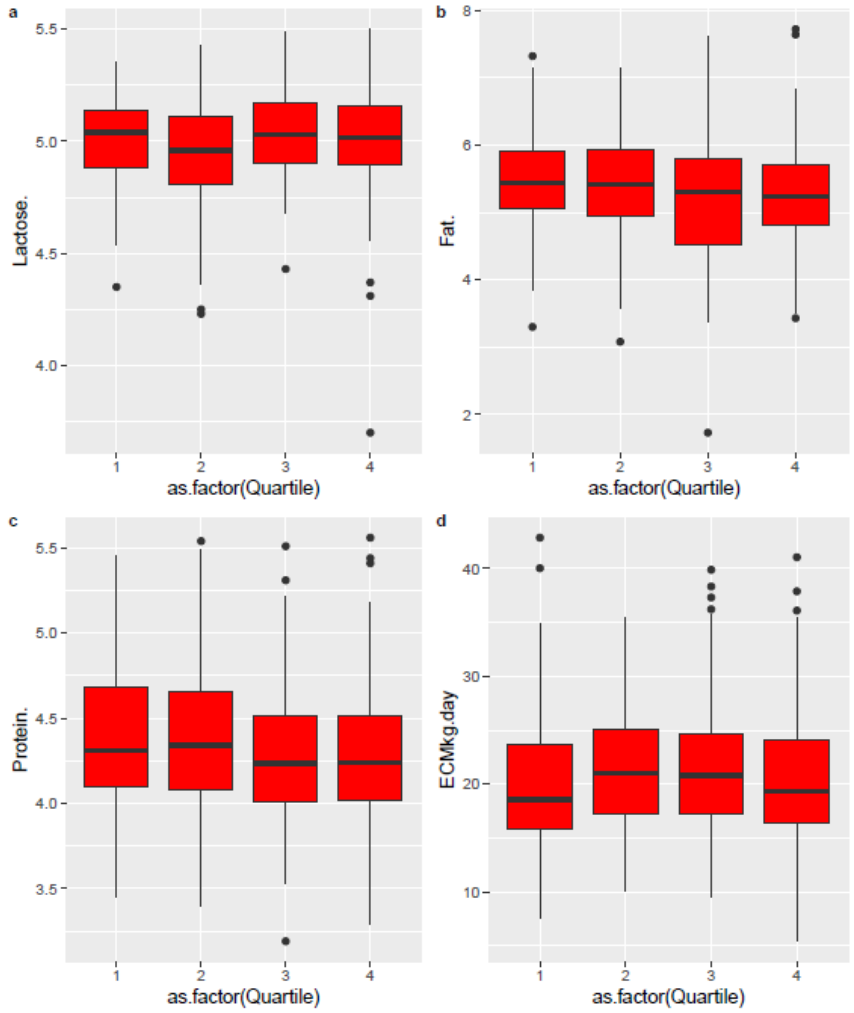


Figure 54: Summary of all herd tests for Herd J, IDEXX SP% quartile and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

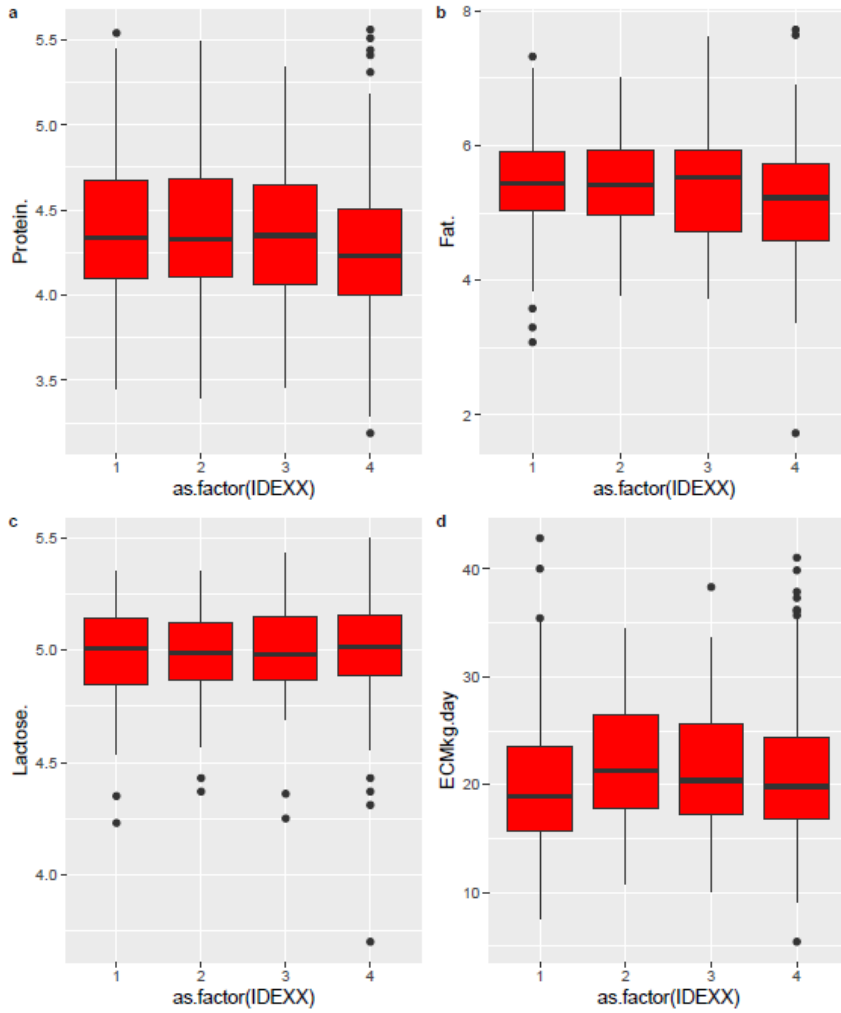


Figure 55: Summary of all herd tests for Herd J, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

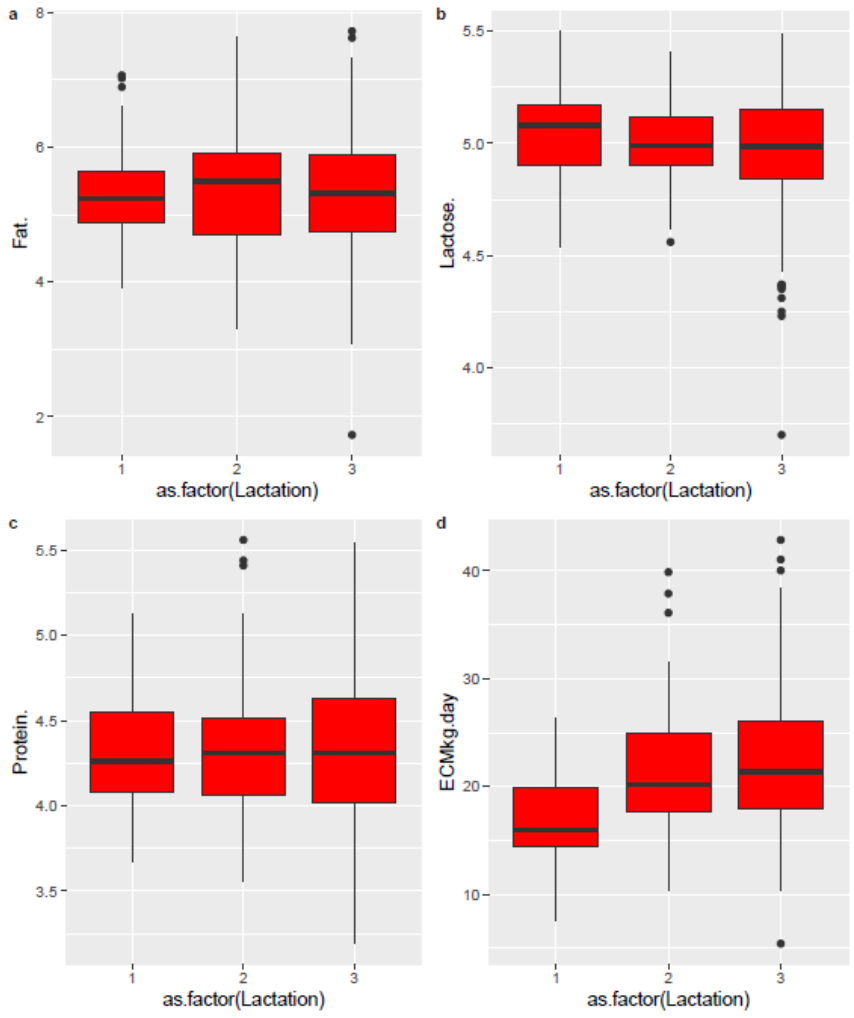


Figure 56: Summary of all herd tests for Herd J, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

Herd K

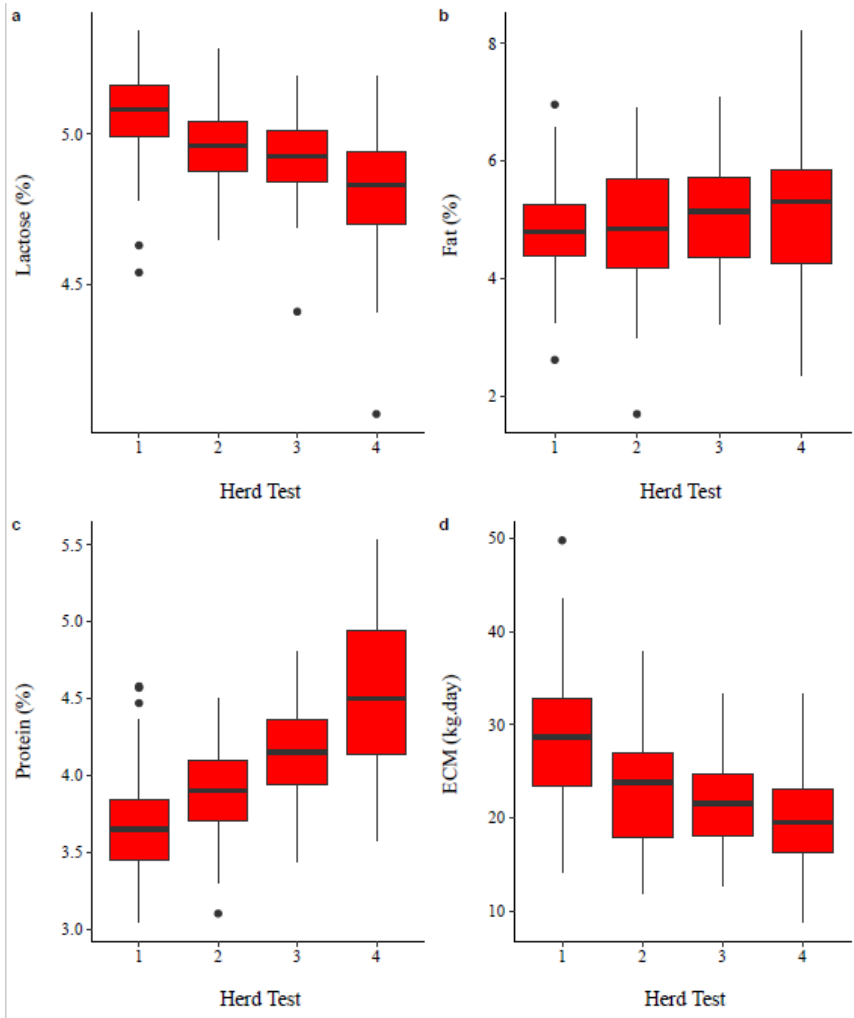


Figure 57: Summary of all herd tests for Herd K and (a) milk lactose % (b) milk fat % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

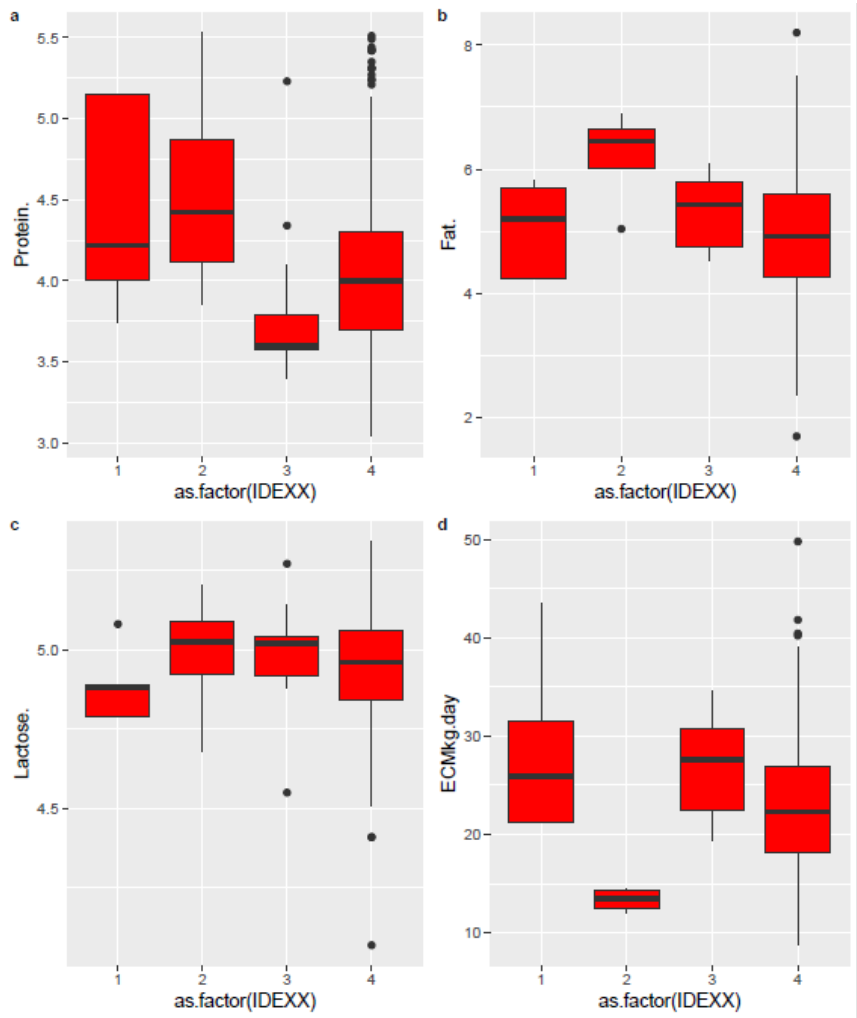


Figure 58: Summary of all herd tests for Herd K, IDEXX diagnostic category (1=negative, 2=mild positive, 3=positive, 4=strong positive) and (a) milk protein % (b) milk fat % (c) milk lactose % (d) energy corrected milk (ECM) (kg/day).

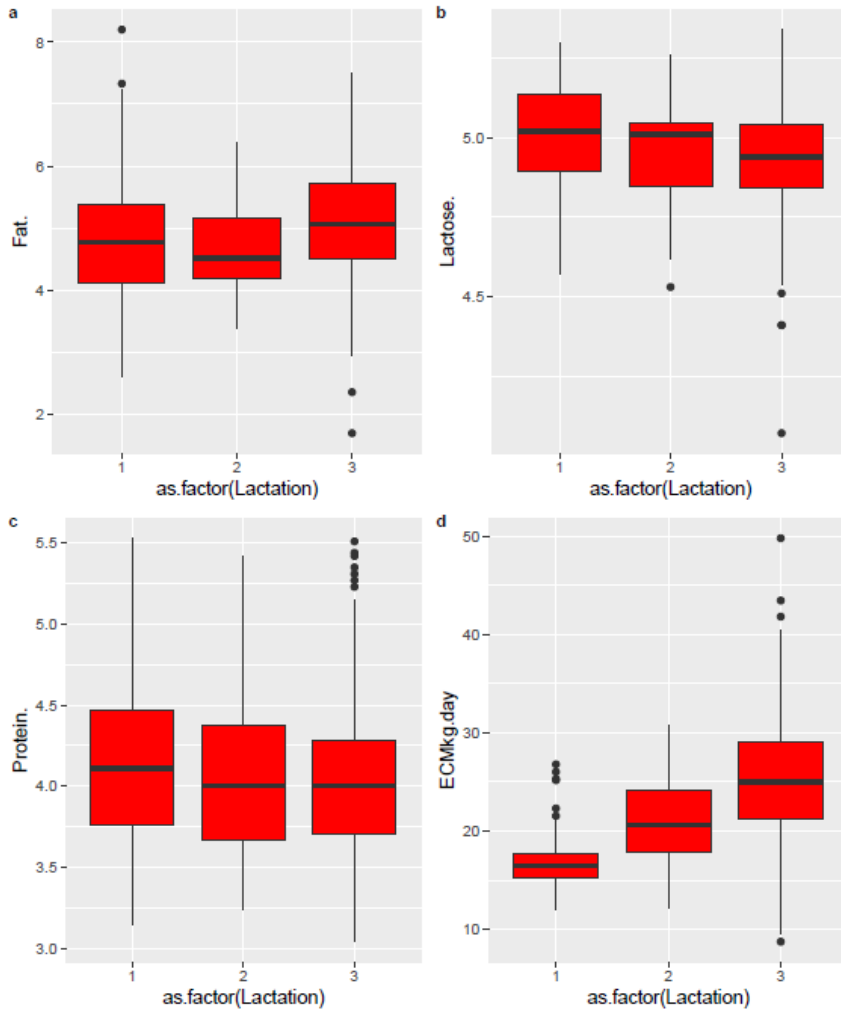


Figure 59: Summary of all herd tests for Herd K, Lactation (1=first, 2=second, 3=third or more) and (a) milk fat % (b) milk lactose % (c) milk protein % (d) energy corrected milk (ECM) (kg/day).

## Coproantigen

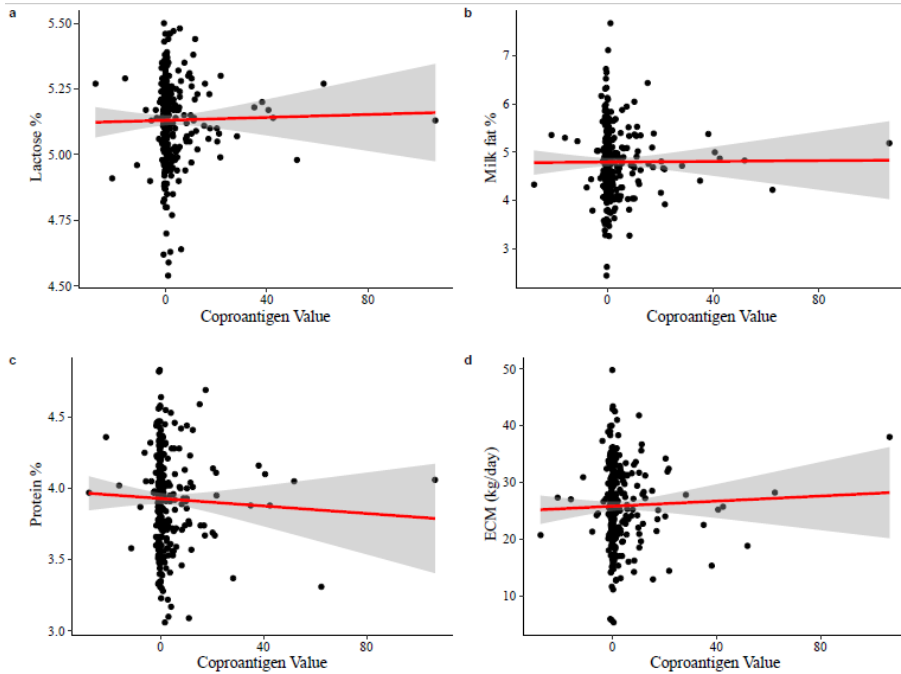


Figure 60: Summary of all herd tests for Coproantigen Value in herd test 1 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

## R code

"i..herd" = herd identifier (A,B,S,D,E,F,G,H,I,J,K)

"test" = herd test (1,2,3,4)

"herdcow" = CONCATINATE??? So each cow is identified by her number and herd so that if there are multiple cows of the same identifier number the code will know they are from different herds

"cow" = cow identifier number allocated by farmer

"SP" = IDEXX SP%

"Quartile" = quartiles of the IDEXX SP% (1,2,3,4)

"IDEXX" = IDEXX diagnostic categories 1 = negative, 2 = mild positive, 3 = positive, 4 = strong positive

"IHELISA" = In-House ELISA optical density ratio (ODR)

"IHQ" = quartiles of the In-house ODR (1,2,3,4)

"Breed" = cow breed allocated by farmer (Friesian, Friesian cross, Jersey, Jersey cross, Crossbred)  
"Lactation" = this current lactation of the cow as a proxy for age (1,2, ≥3)  
"DIM" = days in milk at each herd test as calculated by the calving date recorded by the farmer  
"Milk" = milk volume at the herd test (litres)  
"Lactose." = milk lactose percentage at that herd test  
"Lactosekg" = kilograms of milk lactose at that herd test  
"Fat." = milk fat percentage at that herd test  
"Fatkg" = kilograms of milk fat at that herd test  
"Protein." = milk fat percentage at that herd test  
"Proteinkg" = kilograms of milk protein at that herd test  
"MS" = total milk solids (protein + fat) at that herd test (kg)  
"SCC" = somatic cell count at that herd test  
"ECMkg.day" = energy calculated milk (kg/day)

In the code the variables were added as factors.

```
mod.Cross_Sectional_Study<-lmer(milk production factor~diagnostic criteria + DIMcentre+  
Lactation+ test+ Breed+ I(DIMcentre^2)+I(DIMcentre^3)+(DIMcentre|i..herd/cow ), data=dat)  
summary(mod.Cross_Sectional_Study)  
anova(mod.Cross_Sectional_Study)
```

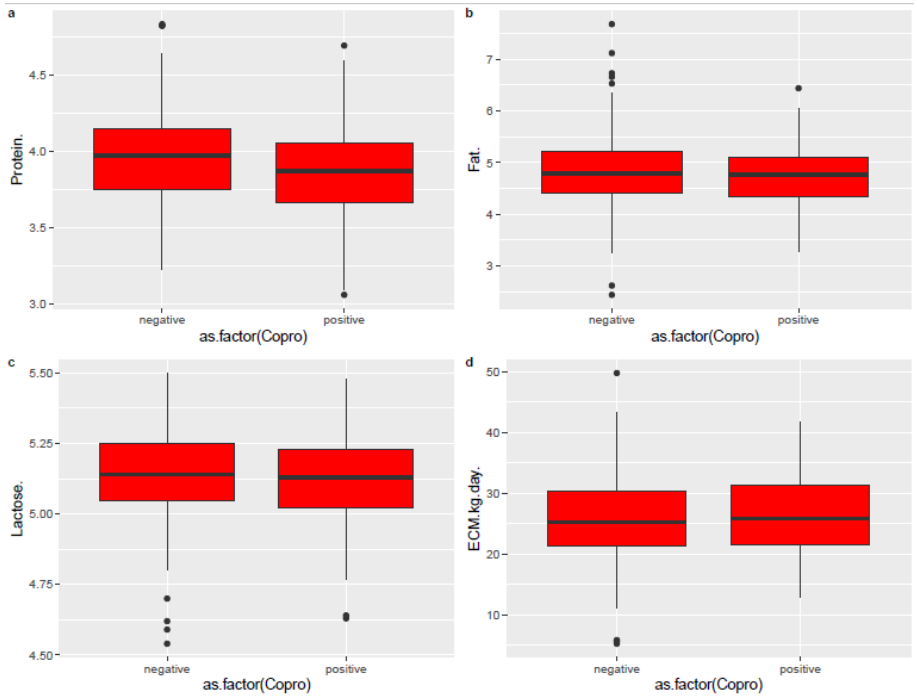


Figure 61: Summary of all herd tests for Coproantigen diagnostic category (negative or positive) in herd test 1 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

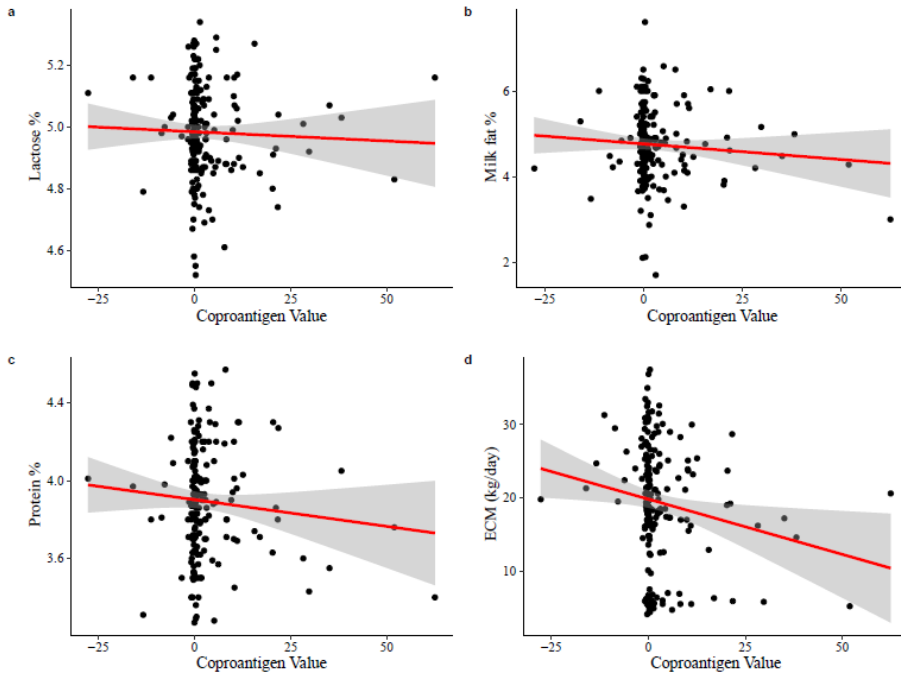


Figure 62: Summary of all herd tests for Coproantigen Value in herd test 2 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

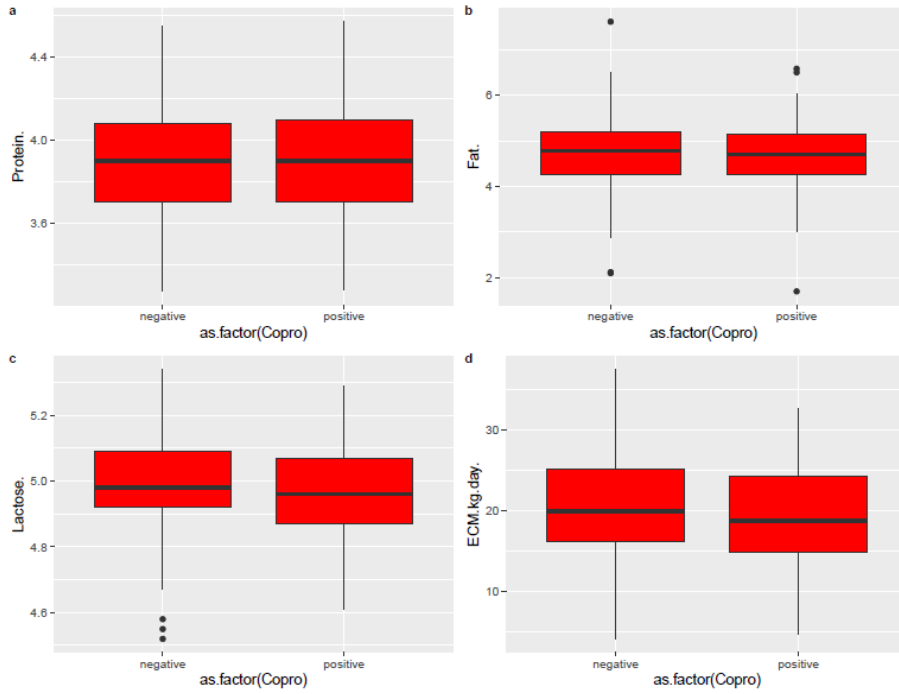


Figure 63: Summary of all herd tests for Coproantigen diagnostic category (negative or positive) in herd test 2 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

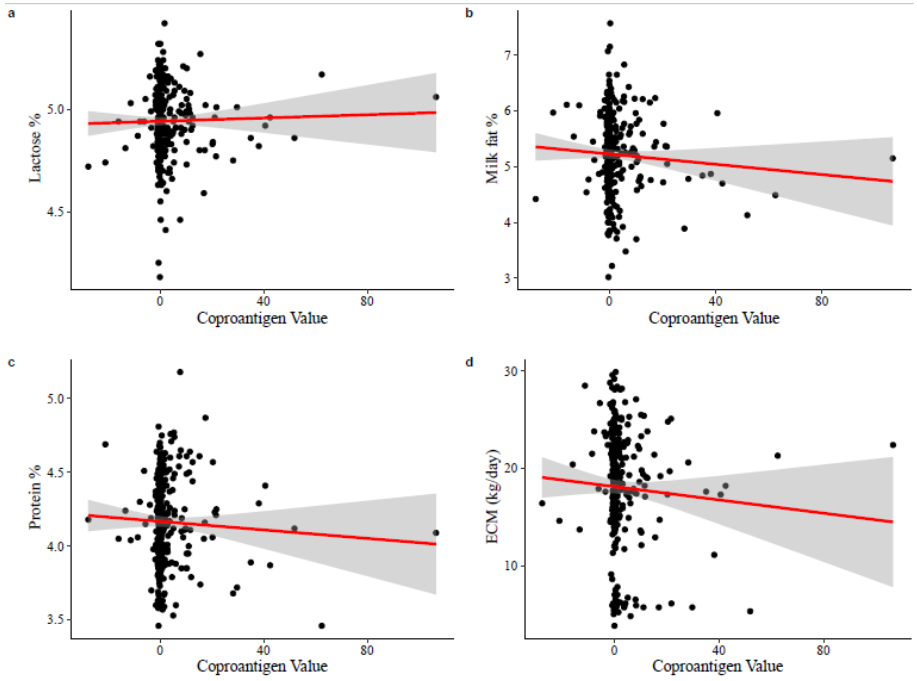


Figure 64: Summary of all herd tests for Coproantigen Value in herd test 3 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

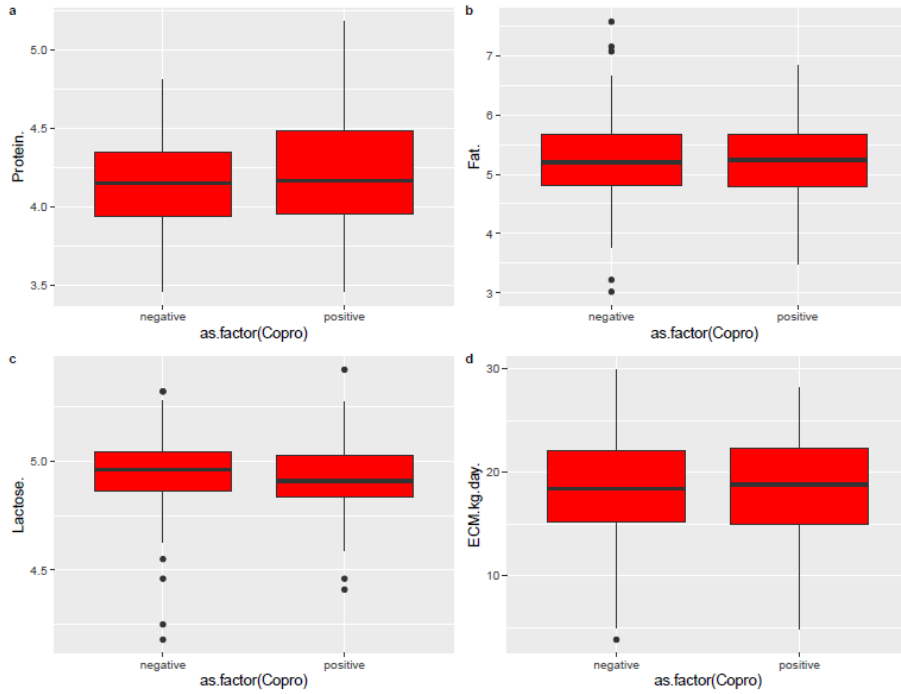


Figure 65: Summary of all herd tests for Coproantigen diagnostic category (negative or positive) in herd test 3 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

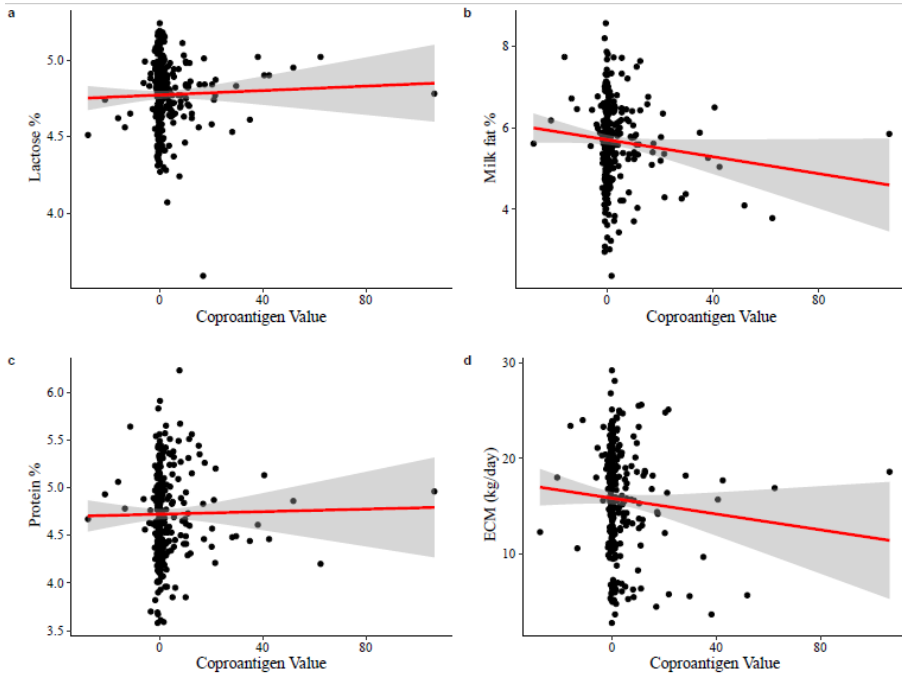


Figure 66: Summary of all herd tests for Coproantigen Value in herd test 4 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)

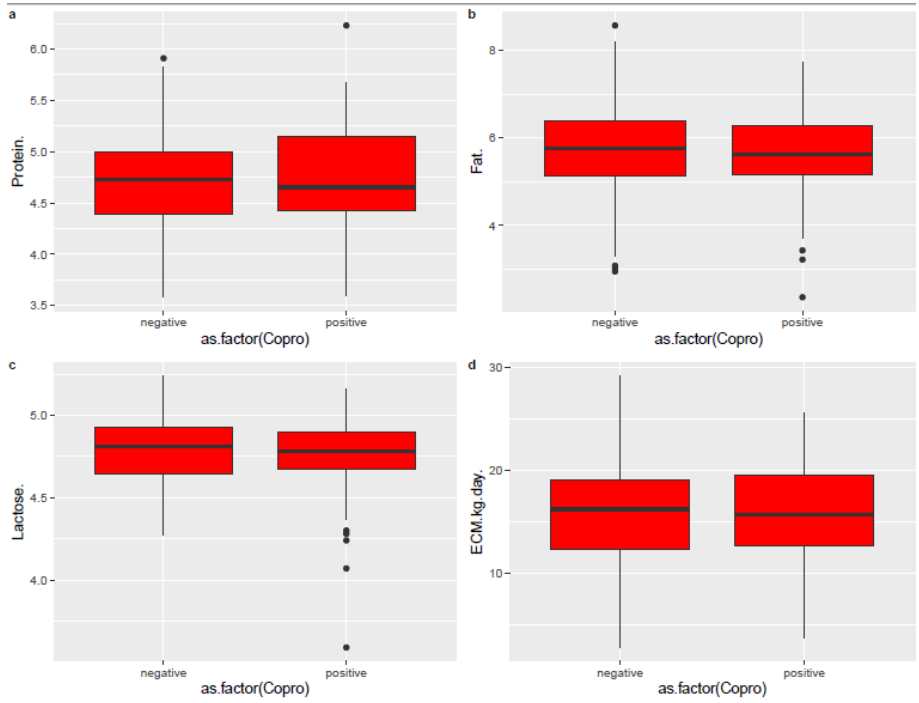


Figure 67: Summary of all herd tests for Coproantigen diagnostic category (negative or positive) in herd test 4 and a) milk lactose % b) milk fat % c) milk protein % d) energy corrected milk (ECM) (kg/day)