Vitamin D_2 and Vitamin D_3 Circulate in Different Fractions of Cattle Plasma

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Introduction

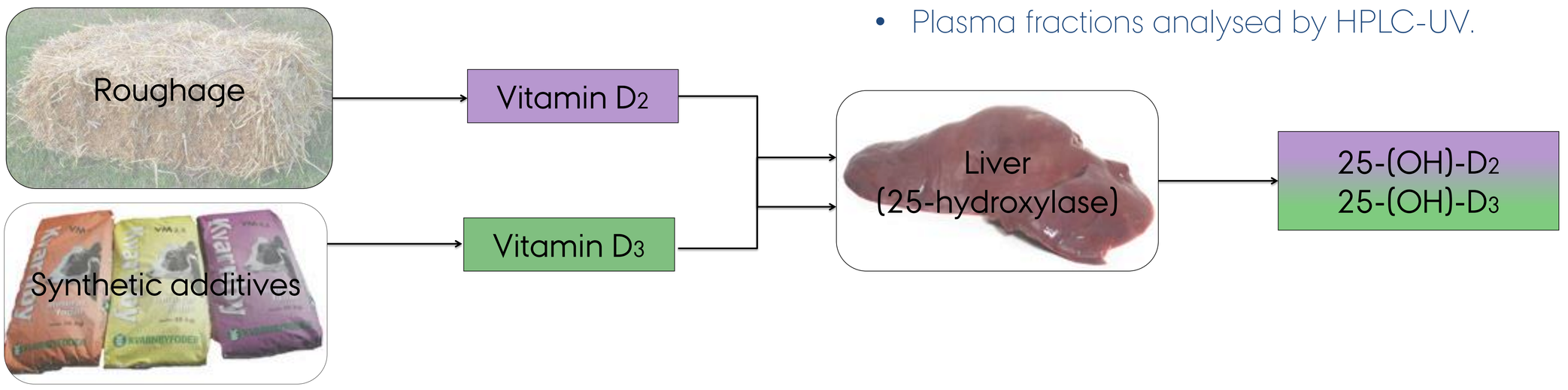
Vitamin D exists in 2 forms relevant to cattle: vitamin D_2 (D_2) and vitamin D_3 (D_3). Both must undergo hydroxylation in the liver to become physiologically active. The resulting 25-(OH)-D_2 ($25OHD_2$) and 25-(OH)-D_3 ($25OHD_3$) are measured as indicators of the vitamin D status in plasma.

It is often stated that D_2 and D_3 have similar physiological effects but studies in cattle have shown, that D_2 is much less efficient than D_3 at securing a sufficient vitamin D status, in cattle.

The aim of the present study was to investigate if binding to different plasma fractions could explain the physiological inefficiency of D_2 compared to D_3 in cattle.

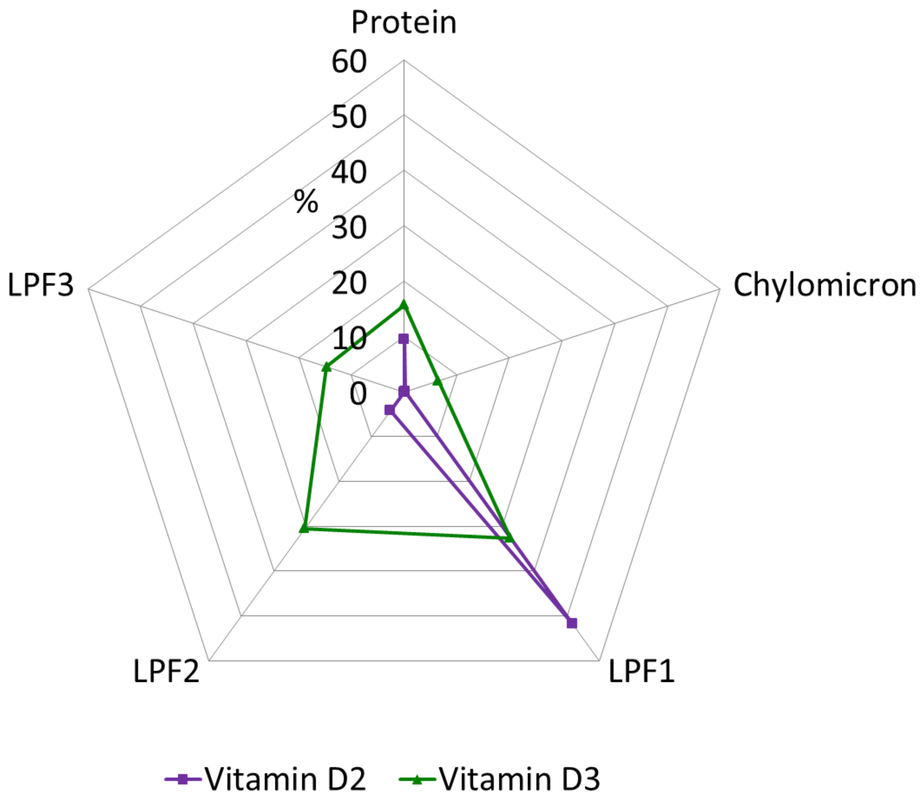
Methods

- 3 Holstein bull calves
- 75µg D_3/day and *ad libitum* hay (contains D_2)
- Blood samples 2 times/week for 11 weeks
- Plasma isolated by centrifugation
- Plasma fractionated by gradient ultra-centrifugation
- Plasma fractions analysed by HPLC-UV.

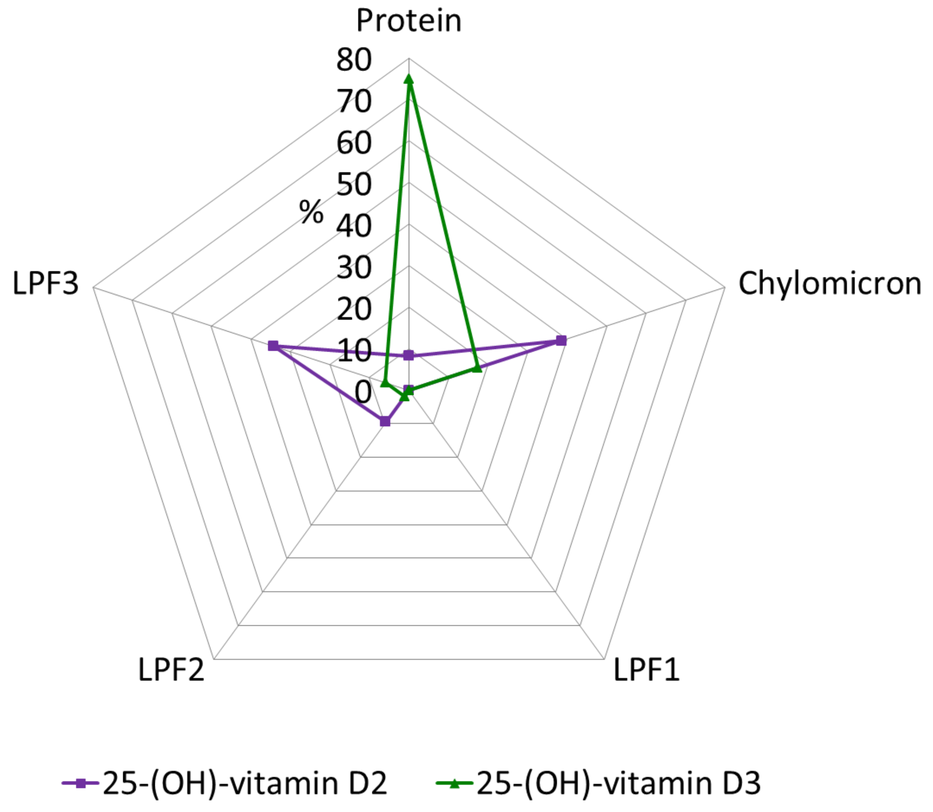


Results and Conclusions

D_2 and D_3 were only transported evenly distributed in protein, whereas the percentage of D_2 and D_3 found in other plasma fractions differed. If this means that D_2 is transported in more volatile plasma fractions than D_3, then D_2 could be more prone to degradation and excretion, contributing to its lower physiological efficiency.



$25OHD_3$ was mainly transported in protein whereas $25OHD_2$ was transported in the chylomicron and heavier lipoprotein. fractions Associating with designated binding proteins is vital to the function of $25OHD_3$. Hence transportation in other plasma fractions than protein could explain a compromised physiological function of $25OHD_2$ compared to $25OHD_3$.



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