

Extended Abstract

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Paper Title	Finding the value of novel feedstuffs in imperfect markets, taking <i>lupinus albus</i> as an example
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Abstract	200 words max
<p>The production and use of feed is an important factor for agricultural economic performance. When new feedstuffs enter the market, livestock farmers are challenged to assess their price worthiness. However, under the conditions of new and often imperfect markets, transparent price formation is hampered. This has a negative impact on trade and impairs the development of sustainable markets. One example of this is the white lupin (<i>Lupinus albus L.</i>). To better determine the value of novel feeds, a decision support system is presented in this study. It is based on a linear optimization model which, by parameterization of the price assumption of novel feeds, determines their substitution value compared to usual feeds. Results for white lupin show that their substitution value as feed varies significantly depending on animal species, production process, performance level and year of cultivation. However, with substitution values up to €557 t⁻¹, the value of white lupin is often well above the rarely available market prices (€270 t⁻¹, as of 12/2021). White lupin is thus an example of a novel feed that is drastically underestimated in value due to imperfect market conditions. The developed decision support system can be used for objective pricing in these cases.</p>	
Keywords	Substitution value; Lupin; Feed; Optimization; Linear Programming; Imperfect Market
JEL Code	Q110 Agriculture: Aggregate Supply and Demand Analysis; Prices; D400 Market Structure, Pricing, and Design: General
Introduction	100 – 250 words
<p>This study will investigate the value of novel feedstuffs using white lupin as an example. The aim is to develop a DSS to determine the price worthiness of novel feedstuffs under conditions "of imperfect markets". A realistic evaluation of price worthiness is not only relevant for the potential user of the feed, but also for retailers and producers. In the case of white lupin, we hypothesize that realistic price worthiness is significantly higher than the current market price. Correcting this situation is expected to help strengthen the cultivation of white lupin. This means contributing to self-sufficiency in protein-rich feed, more biodiversity in the agricultural landscape, and partial substitution of climatically questionable imports of soybeans (Escobar et al. 2020 ; Castanheira und Freire 2013). The DSS presented in this paper thus has direct relevance not only for agriculture and the agricultural sector,</p>	

but also, in this particular application, for important political and societal goals in Europe.

Methodology

100 – 250 words

For the establishment of fair market prices of non-market feeds, two values are particularly relevant: On the one hand, the substitution value that the feed achieves when used in animal feeding. For this purpose, an LP model is applied: By parameterizing price assumptions (in constant scale rates), the substitution value and the input level of a novel feed is determined in direct comparison with established feeds.

On the other hand, the production and processing costs of novel feeds are important. Only if these are below the aforementioned substitution value is there a chance that novel feeds will become established in the long term. The production costs are addressed in form of a total cost calculation.

Results

100 – 250 words

The decision support system itself counts as an important outcome of this study. It will be freely accessible to future users.

The results show:

- a) that the value of lupins is subject to significant variations in different crop years. This is due to differences in nutrient contents, probably caused by annual effects.
- b) that the value of novel feeds depends on the type of animal, the direction of use and the level of production.
- c) that the substitution value of lupins (as feedstuffs) is significantly higher than the scarcely available market prices.

Discussion and Conclusion

100 – 250 words

Using a practical example, this study shows that it can be very difficult for novel feedstuffs to reach a price agreement between the producer and the consumer. The methodology used in this study can help to overcome this barrier. In particular, the DSS presented is a valuable tool for potential buyers of novel feedstuffs to identify upper price limits. It should therefore be used and is therefore freely available (LINK). In the case of white lupin, it has been possible to use this tool to demonstrate, that its value as a feed is significantly higher than the sparse market price data available. The price situation also results in only small quantities being offered on the market, which in turn makes it difficult to establish a targeted demand for white lupins. Hopefully, the detected discrepancy between the market price and the actual value

as animal feed will lead to an increased demand for white lupins and thus promote local cultivation. Overall, society also benefits when the value of novel feedstuffs is identified as accurately as possible, as this potentially contributes to diversified land use and more economically efficient livestock production. In the case of white lupin, an additional contribution to the supply of domestic protein feed could be achieved.