

## From agriculture to bioeconomy



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In 1998 a paper by geneticists Juan Enriquez Cabot and Rodrigo Martinez titled “Genomics and the World’s Economy” was published in Science. This paper has been credited with being the origin of the concept of bioeconomy. While it does not coin the term “bioeconomy” it predicts how discoveries in genomics will lead to the creation of an entirely new and integrated biologically based economic sector with revolutionary implications for the global economy. Subsequent definitions of “bioeconomy” generally mention two sectors – one that produces biological resources (e.g. agriculture, aquaculture, forestry) and another that industrially transforms them via the use of biotechnologies.

While many read this as positive for agriculture – the interests of these two sectors are not necessarily compatible. In particular, the recent development of animal protein synthesis technologies should concern Norway’s agricultural producers. For livestock producers, synthetic protein production represents direct market competition that could affect the economic viability of the sector. Grain producers could also be affected. Protein synthesis does not necessarily require agriculturally produced biomass to transform but uses whichever biomass is cheapest and best suited to the production process – whether it be derived from forestry, agriculture or the oceans.

What are the implications of this development for Norway’s agricultural sector? Synthetic animal protein is yet to arrive on the market as it faces two major problems – insufficient bioreactor capacity and the lack of a reliable and cheap artificial serum to replace that obtained from slaughtered animals. However, a number of qualities of synthetic protein suggest that the so-called “post-animal bioeconomy” could become a reality over the next decades, threatening the production of farmed animal proteins. These are presented here, along with a discussion of what the implications may be for Norwegian agriculture and what steps might be needed to future-proof Norwegian agriculture against a possible biotechnological revolution in animal protein production.