



## Future structural developments in Dutch and German livestock production and implications for contagious livestock disease control

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### ABSTRACT

The structure of livestock production is subject to driving forces that alter veterinary and economic risks of contagious livestock diseases. Insight into changes in this structure is thus important for veterinary contingency planning.

The objective of this paper was to explore changes in future production structure features within the cross-border region of the Netherlands (NL), North Rhine Westphalia (NRW) and Lower Saxony (LS) projected towards 2020 using the Policy Delphi method. Additionally, the findings of this study were elaborated in terms of possible implications for contagious livestock disease introduction, spread and control.

Experts expected a sharp reduction in the number of farms, a sharp increase in farm size and regional concentration of livestock production, especially in NL. Increases in cross-border trade were expected, particularly in the pig sector, resulting in intensified mutual cross-border production dependency in most sectors. The cross-border region of NL-NRW-LS becomes, therefore, increasingly a single epidemiological area in which disease introduction is a shared veterinary and, consequently, economic risk. This situation results in increased need for collaboration among NL-NRW-LS to improve the joint prevention and control of contagious livestock diseases. It is concluded that veterinary policy makers should proactively anticipate these future changes in the production structure of livestock.

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### 1. Introduction

The European Union (EU) aims to ensure a uniform and high level of animal health throughout the EU without compromising the functioning of the single market. The EU has, therefore, implemented a strategy of non-vaccination for most contagious livestock diseases, resulting in a highly susceptible livestock population [1]. The single market, as such, has resulted in increased intra-communitary cross-border trade in livestock (i.e., economic advantages) but also in increased veterinary and economic consequences due to

outbreaks of contagious livestock diseases throughout the EU, as experienced in previous outbreaks of classical swine fever (CSF) [2] and foot and mouth disease [3].

The risks of the introduction and spread of such diseases are mainly determined by (in)direct animal contacts [4]. These contacts are driven by features of the production structure of livestock, such as the number of farms, farm size, the concentration of farms in certain areas, specialization of production and reliance on cross-border production markets (see, e.g., [5–8]). In other words, production structure features are important determinants of the frequency of occurrence and magnitude of contagious livestock diseases, and consequently, their economic impact. In addition to the production structure features, consumption market features, such as product acceptance of affected livestock sectors and market disruptions, determine the economic impact directly [9].

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During the last decades, major changes in the production structure of livestock have occurred within the EU. As a result, the mutual dependency on cross-border livestock trade among certain countries has increased. A particular example is the cross-border region of the Netherlands (NL) and the German states of North Rhine Westphalia (NordRhein-Westfalen, NRW) and Lower Saxony (Niedersachsen, LS) (Fig. 1). For example, Dutch environmental legislation caused a structural change in pig production in which farmers switched from the production of fattening pigs to that of piglets [10]. As a result of a shortage of fattening places, a quarter of the Dutch piglet production is exported to Germany (GER) and consequently, Dutch piglet producers and German fattening pig farmers highly depend on each other with respect to pig production. In addition to pig production, other Dutch and German livestock sectors show similarly increased mutual cross-border dependency, and a further increase is expected in the near future [11].

The foregoing example demonstrates that it is essential for veterinary policy makers to have a good insight into the future developments of those features of the livestock production structure that influence disease introduction, spread and control, such as the number of farms and farm size. In particular, veterinary contingency planning can benefit from and account for these insights in developments. Moreover, from an economic point of view, veterinary policy makers should consider future developments in consumer preferences and markets as well.

Existing studies that analyze the future structure of livestock production primarily explore the driving forces that affect the future supply and demand of (EU) agricultural commodities at the macroeconomic level (see, e.g., [10,12–14]). That focus means that these studies ignore the consequences of changes in the production structure on the risks of disease introduction, spread and control. The same applies to country-specific and regional effects and effects on cross-border trade for countries that highly rely on cross border trade.

In the light of the foregoing, the objective of this paper was to explore changes in future production structure features within the cross-border region of NL, NRW and LS (Fig. 1) projected towards 2020 using the Policy Delphi method.

Section 2 presents the methodological justification of the Policy Delphi method as well as the applied study design. Section 3 presents the main results. In Section 4, both the methodology and results are discussed. Additionally, the findings of this study were elaborated in terms of possible implications for contagious livestock disease introduction, spread and control.

## 2. Material and methods

### 2.1. Methodological justification

A good insight into the future developments of those features of the livestock production structure that influence disease



Fig. 1. A map of the extended cross-border region of the Netherlands (NL), North Rhine Westphalia (NRW), and Lower Saxony (LS) [45].

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