

Brexit: How Will UK Agriculture Fare?

Brexit : Comment l'agriculture du Royaume-Uni va-t-elle réagir?

Brexit: Wie wird es der Landwirtschaft des Vereinigten Königreichs ergehen?

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There is little doubt that the UK agri-food sector will be one of the sectors most seriously affected by Brexit. Not only is it dependent on trade relations both with the European Union (EU) and with the Rest of the World (RoW), but it is also a sector dependent on migrant labour, and is heavily subsidised and regulated under the present Common Agricultural Policy (CAP). The current Westminster government through its Department for Environment, Food and Rural Affairs (Defra) and the UK Treasury is trying to reassure British farmers and the larger public that Brexit is a once in a life-time opportunity to replace the 'fundamentally flawed' CAP with 'our own national food policy, our own agriculture policy, ..., shaped by our

own collective interests' (Secretary of State Michael Gove, 2018). Moreover, UK farmers are guaranteed to receive the same level of subsidy (as under the CAP) until the end of 2022. Despite these efforts, the lack of concrete policy decisions and the uncertainty that surrounds the terms of negotiations with the EU make UK farmers and rural communities very anxious indeed. Thus, how future UK Agricultural Policy (UKAP) will look after the country leaves the EU and what the economic and social implications of Brexit will be, remain open to debate and academic research.

A few notable studies (Boulanger and Philippidis, 2015; Bradley and Hill, 2017; Davis *et al.*, 2017; Van Berkum

et al., 2016) have assessed the potential effects of exit on the UK agricultural sector using different scenarios and assumptions. However, there remains an absence of more comprehensive research including analysis of variation in the effects of different trade and domestic policy options across heterogeneous farm populations and, regionally, among the UK devolved administrations.

“ L'élimination des paiements directs affectera la plupart des entreprises agricoles ... mais de nombreuses exploitations d'élevage bovin et ovin auraient du mal à survivre. ”

This gap is addressed in a current Brexit priority grant project – *How might UK Agriculture Thrive or Survive?* – funded by the UK Economic and Social Research Council (ESRC). Specifically, the project aims to estimate the possible macro-, sector- and farm-level effects of selected trade and domestic policy scenarios for UK agriculture. To achieve these aims, projections from macro-sector models are linked to a series of farm models which are then used to evaluate the micro-economic impacts of Brexit scenarios on farm businesses and households. Further details on the models and interactions between them are provided in Box 1. This



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Box 1: Overview of the models used

The models used in the project are integrated as follows. First, an agriculture-specific variant of the well-known Global Trade Analysis Project (GTAP) multi-region computable general equilibrium (CGE) model is used, called Defra-Tap (Philippidis *et al.*, 2007; Philippidis and Kitou, 2012). The CGE model is calibrated to Release 9 of the GTAP database (Narayanan *et al.*, 2015) with information on cost and demand structures, gross bilateral trade data, transport costs and trade protection for 57 activities in 140 regions, for the year 2011. In explicitly representing the input-output relationships among various sectors, the model is well suited to assessing the knock-on impacts on the wider economy given a policy change in a particular sector. Specifically in this project, it is used to estimate impacts of the Brexit scenarios focusing on the wider macro economy and the factor markets.

Second, applying common scenario assumptions, disaggregated commodity-level projections for prices, production and trade flows are estimated with the UK-FAPRI partial equilibrium model (Feng *et al.*, 2017; Moss *et al.*, 2009). Unlike the CGE model, the partial equilibrium model focuses on a specific sector (agriculture in this case), assuming the knock-on impacts on the wider economy and, hence, the feedback effect on the sector studied are negligible. Building on this assumption, the model provides more detailed and disaggregated results within the sector, hence, the name ‘sectoral model’.

Third, the CGE and UK-FAPRI models are linked to a series of representative farm models. Results from the aggregate models underpin key assumptions in the farm models, the values of which are treated as exogenous. These include factor price projections (e.g. land rents and wages) from the CGE model and output and direct-input price projections from the UK-FAPRI model. The farm-level modelling comprises detailed financial simulations for 2,803 businesses in the Farm Business Surveys of England, Wales, Scotland and Northern Ireland. Furthermore, they are weighted using agricultural census data, so they represent some 90,000 commercial farms accounting for more than 90 per cent of UK agricultural output. To control for inter-year variability, baseline management account data used for each farm are three-year averages for 2013/14–2015/16.

article focuses on some preliminary findings from this ongoing research.

Selected trade and domestic policy scenarios

The scenarios are chosen to represent a broad range of feasible options for: i) *trade relations* with the EU and the Rest of World; ii) *domestic UK policy* for direct payments to farmers (currently the Basic Payments Scheme). In addition to the main analysis, sensitivity analysis (not reported here) has been undertaken with regards to two other *major conditioning factors* for the economic effects of Brexit policy on UK Agriculture: i) restrictions on migrant labour; and ii) the sterling exchange rate, both with the Euro and with the US dollar. We acknowledge, however, that restricting our attention in this way ignores Brexit implications and options for both *environmental policies* and also for *market, product and process regulations*.

We modelled three selected trade policy scenarios (Table 1), designed to cover the range of likely outcomes of the UK–EU negotiations and which were discussed and agreed with relevant stakeholders: (i) UK–EU Free Trade Agreement (**FTA**); (ii) Unilateral Trade Liberalisation (**UTL**); and (iii)

return to World Trade Organisation tariffs (EU Tariffs Schedule – **WTO**).

Brexit clearly implies that the UK, and the devolved administrations, will need to reconsider the framework of agricultural policy currently determined by the EU. At present, under the CAP, UK farmers receive public support through both Pillar 1 (area

based payments and within Scotland a limited amount of coupled support in the beef and sheep sectors) and Pillar 2 (e.g. agri-environmental schemes and less favoured area payments). Following Brexit, we consider the likelihood of continued support payments to UK farmers from two perspectives. On one hand, there is considerable pressure from farming

Table 1: Selected UKAP trade scenarios

FTA	UTL	WTO
<ul style="list-style-type: none"> Comprehensive UK/EU FTA with UK–EU tariffs at zero UK adopts the EU common tariff schedule on RoW imports UK maintains share of EU Tariff Rate Quotas (TRQs) applying to RoW imports Additional trade costs of 5 per cent (livestock) and 2 per cent (crops) for UK↔EU trade flows 	<ul style="list-style-type: none"> An extreme free-trade scenario The elimination of all UK import tariffs for RoW including imports from the EU Additional trade costs of 10 per cent (live-stock) and 5 per cent (crops) for UK↔EU trade flows 	<ul style="list-style-type: none"> No agreement by March 2019, hence ‘reversion’ to WTO rules & schedules UK trading with EU and RoW under WTO Most Favoured Nation tariffs Requires a UK allocation of a share of the current EU tariff rate quotas (TRQs) with the RoW Additional trade costs of 8 per cent (livestock) and 4 per cent (crops) for UK↔EU trade flows



The lack of concrete policy decisions and the uncertainty that surrounds the terms of negotiations with the EU make UK farmers and rural communities very anxious indeed.

groups for support in some form, and indeed the current payments have been guaranteed until 2022. On the other, there will also be significant pressure from both the Treasury and other spending Ministers to reduce and eventually eliminate these payments (particularly the direct support), releasing funds perhaps for other purposes, e.g. ecosystem services and rural development. Hence, we assume two domestic policy scenarios: (i) direct payments retained as currently under the CAP, and (ii) a gradual elimination of direct payments over a five-year period (2020–25). We also assume that Pillar 2-type payments will continue after Brexit at current levels. Since the eventual production effects of these two UK domestic policy options should be rather similar as far as our macro and sector models are concerned, we present results for the three trade scenarios, each with (+) and without (–) direct payments, in order to distinguish between the trade and domestic policy effects.

The selected trade and domestic policy scenarios are modelled against a baseline scenario which assumes that the UK remains fully integrated in the Single Market and the Customs Union, with direct payments in place. The analysis covers the projection period 2017 to 2026, with Brexit scenarios beginning in 2019, where the outcomes in the final year (2026)

represent the longer-run projections of the consequences of the scenarios.

Selected key findings

Our CGE modelling shows that in all scenarios considered, Brexit has a negative impact on UK Gross Domestic Product (GDP). A reversion to WTO under most favoured nation (MFN) tariff schedules reduces it the most, circa 0.4 per cent per annum on average, whereas UTL reduces it the least, 0.22 per cent per annum on average (Table 2). Thus, in macroeconomic terms, the impacts that arise

from the scenarios are relatively small. This is because average tariffs in the wider economy between the UK and EU, as well as the assumed trade cost increases, are only moderate for the majority of UK economic activities. In those scenarios where larger tariffs and/or trade cost shocks occur, these effects are typically restricted to agri-food industries, which constitute only a small share of the UK GDP. Despite the small impacts at the macroeconomic level, considerable potential impacts are expected, both for the agri-food sector and food consumers in terms of retail price changes, as elaborated below.

At the sector level, there are also potential impacts on farm production and market prices confirmed by both the CGE and FAPRI models. Trade negotiations with the EU and the RoW will be paramount, and the impact of trade agreements on the sector is conditioned by the degree of trade competitiveness (i.e. relative tariffs) and trade openness. It also depends on the status of the sub-sector concerned (e.g. beef, sheep, dairy, pigs, poultry, wheat and barley) and whether the UK is a net importer or net exporter of specific commodities. Even a relatively ‘soft’ Brexit, a bespoke free trade agreement with the EU close to current arrangements (i.e. FTA+), would create some disruption to trade flows, albeit with estimated market impacts that are

Table 2: CGE general effects on UK GDP, agri-food output and prices (cf. baseline projection 2026)

	Scenarios					
	FTA		UTL		WTO	
	+ DP	- DP	+ DP	- DP	+ DP	- DP
UK GDP (%)	-0.34	-0.33	-0.22	-0.22	-0.42	-0.41
UK production (%):						
Agriculture	0.4	-2.9	-0.9	-4.2	1.9	-1.1
Food	0.4	-0.6	2.0	0.9	0.8	0
- all meat (red and white)	2	-0.8	-11.8	-15	14.8	12.5
UK prices (%):						
Agriculture (farm gate)	0.1	3.3	-0.5	2.6	2.0	5.5
- crops	0	2.6	0	2.3	1.2	4.0
- livestock	0.1	3.7	-0.8	2.8	2.5	6.4
Food (retail prices)	0.4	0.8	0	0.3	3.7	4.1
- all meat (red and white)	1.1	2.0	-4.3	-3.6	7.3	8.3

relatively small. The market impacts are mainly due to the introduction of an assumed increase in UK and EU trade facilitation costs (to capture the UK's loss of access to the single market), which leads to changes in the UK terms of trade. However, they are mitigated by the removal of UK-RoW tariffs (UTL scenario) or amplified by the adoption of the current EU schedule of WTO MFN tariffs (WTO scenario). In the case of products where the UK is a net importer (e.g. beef) the imposition of tariffs reduces the competitiveness of the imported product resulting in higher domestic producer prices in the UK. The converse applies for products where the UK is a net exporter (e.g. lamb) to the EU.

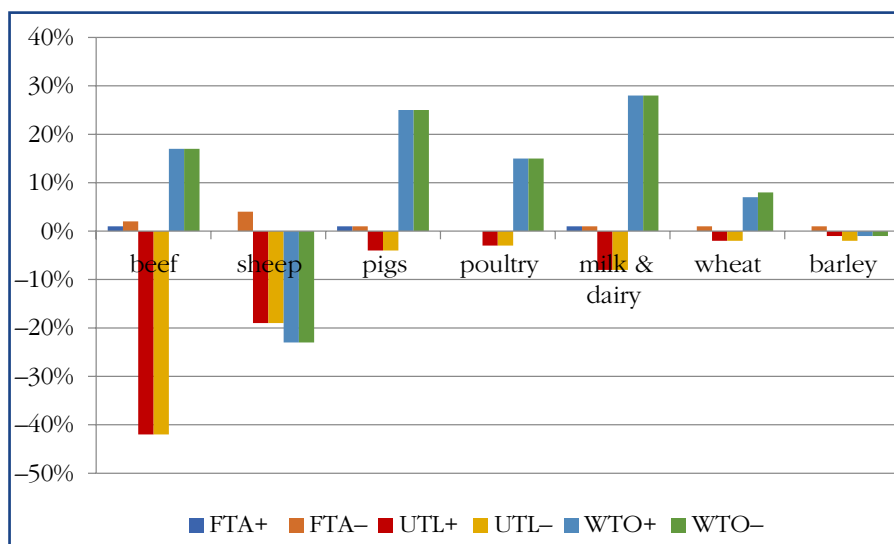
“ Die Abschaffung der Direktzahlungen hat Folgen für die meisten landwirtschaftlichen Betriebe ... viele Rinder- und Schafzuchtbetriebe würden um ihr Überleben kämpfen. ”

Additionally, the CGE model (Table 2) confirms an increase in the UK farm gate prices for primary agriculture and retail prices for processed food under WTO. For example, under WTO+, estimates for the meat sector and food processing are particularly high compared with the baseline, e.g. 7.3 per cent and 3.7 per cent increase in retail prices, respectively. However, the CGE and FAPRI price projections are broadly similar after taking account of differences in retail and producer prices and aggregation of prices. These price effects are consequences of the adjustment to WTO MFN tariffs on EU trade and the imposition of UK and EU trade facilitation costs (4 per cent for crops and 8 per cent for livestock). The removal of direct payments (WTO-) increases the equivalent per unit cost of agricultural production, hence resulting in further price increases.



The impact of Brexit on UK agriculture will be far from uniform.

Figure 1: FAPRI – Percentage change in UK producer commodity prices (cf. baseline 2026)



Many beef and sheep farms would struggle to survive, as they tend to be much more reliant on direct support.

A unilateral trade liberalisation (UTL) decision to remove agricultural import tariffs from the RoW and from the EU,

would see domestic producer prices fall markedly for all products, particularly for beef and sheep. Specifically,

under UTL+, the FAPRI model estimates a large increase in imports from RoW for the UK beef sector. This reflects the highly competitive nature of overseas suppliers (e.g. Brazil and Australia), and results in the domestic producer beef price falling close to world levels, by 42 per cent (Figure 1). Interestingly, removing direct payments hardly affects prices further in both models, since the reductions in domestic quantities produced are offset by changes in trade flows.

Our farm modelling also shows some interesting results regarding the distribution of farm business income across the devolved administrations and by farm type (Figures 2 and 3) and the importance of retaining and eliminating direct payments (Figures 4 and 5). As with other EU Member States, direct payments are a crucial component of farm business income in the UK. Thus, while some farm businesses will survive, many might not. The negative impact on farm business income is reflected across all trade scenarios, especially UTL with or without direct payments (DPs). Average farm income varies significantly across the devolved administrations and by farm type, with most farms worse off (relative to the baseline) under all scenarios but one, WTO+. Noticeably, under this scenario dairy farms will particularly benefit as their average farm income could almost triple compared to the baseline scenario. Beef and sheep farms will be the most affected under UTL-. Indeed, our extreme free trade scenario leads to some striking results regarding farm income distribution. Whereas 15–20 per cent of the farms were not making any money at all (even in the baseline scenario), this rises to 45 per cent under the UTL scenario with direct payments still in place (UTL+). The elimination of direct payments further increases this figure to 70 per cent (UTL-).

Discussion and concluding remarks

Our preliminary results show that Brexit would have significant implications for UK agriculture, a sector with strong trade links to the EU and reliance on CAP income support. Trade scenario

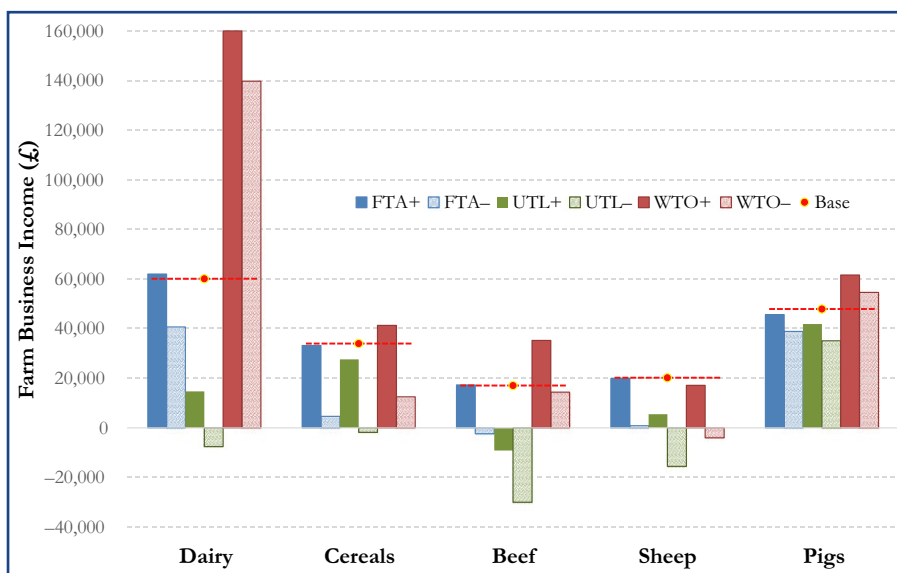


While some farm businesses will survive Brexit, many might not.

Figure 2: Estimated average farm income by country and scenario (2026)



Figure 3: Estimated average farm income by scenario and farm type, UK (2026)



effects depend on the net trade position, and/or world prices. Under a Free Trade Agreement (FTA) with the EU, agricultural impacts are relatively modest. By contrast, unilateral removal of import tariffs (UTL) has significant negative impacts on prices, production and incomes. Adoption of the EU's WTO tariff schedule for all imports (including from the EU) favours some net importer sectors (e.g. dairy) and harms exporter sectors (e.g. sheep). These trade effects, however, might be overshadowed by

the exchange rate and possible labour market changes and other non-tariff barriers (not addressed in this article).

Given the dependence of many UK farms on direct payments, their removal, predictably, worsens the negative impacts of new trade arrangements and offsets positive impacts. Indeed, the elimination of direct payments will affect most farm businesses but the magnitude varies by enterprise and devolved

administration. Arable and dairy farms may be relatively unaffected, but many beef and sheep farms would struggle to survive, as they tend to be much more reliant on direct support. If direct payments are to be removed under future UK agricultural policy, then resulting financial pressures may accelerate structural and land-use change, including agricultural land abandonment in more marginal locations (e.g. in Scotland). Hence, the impact of Brexit on UK agriculture will be far from uniform. Despite some differences regarding the relative changes in prices and output across the sector and commodities, our estimates are broadly in line with the studies of van Berkum *et al.* (2016), Davis *et al.* (2017) and Bradley and Hill (2017).

Figure 4: Farm income distribution by scenario with DPs, UK (2026)

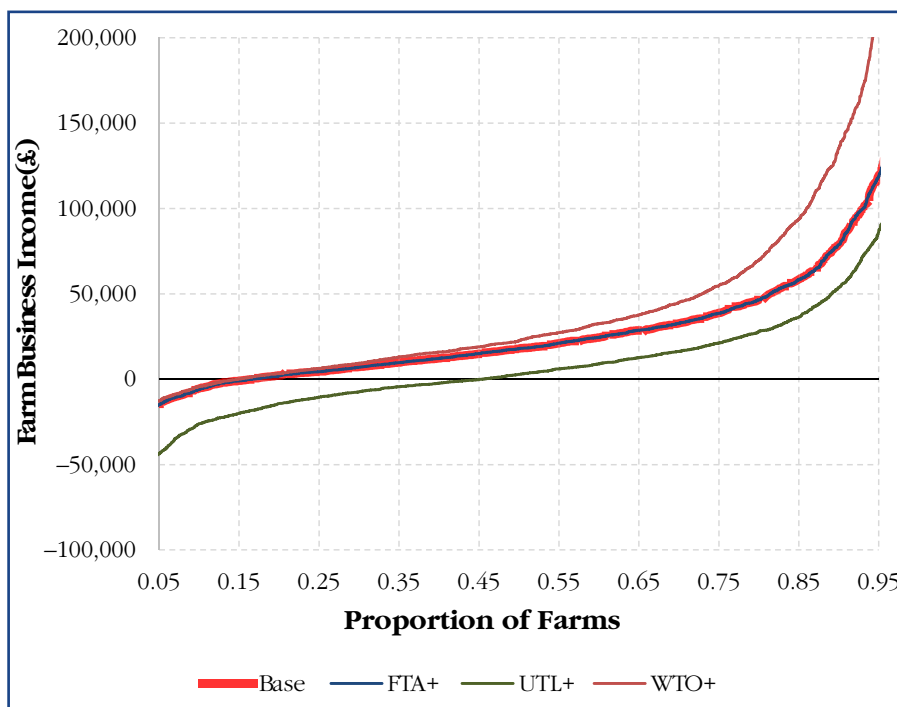
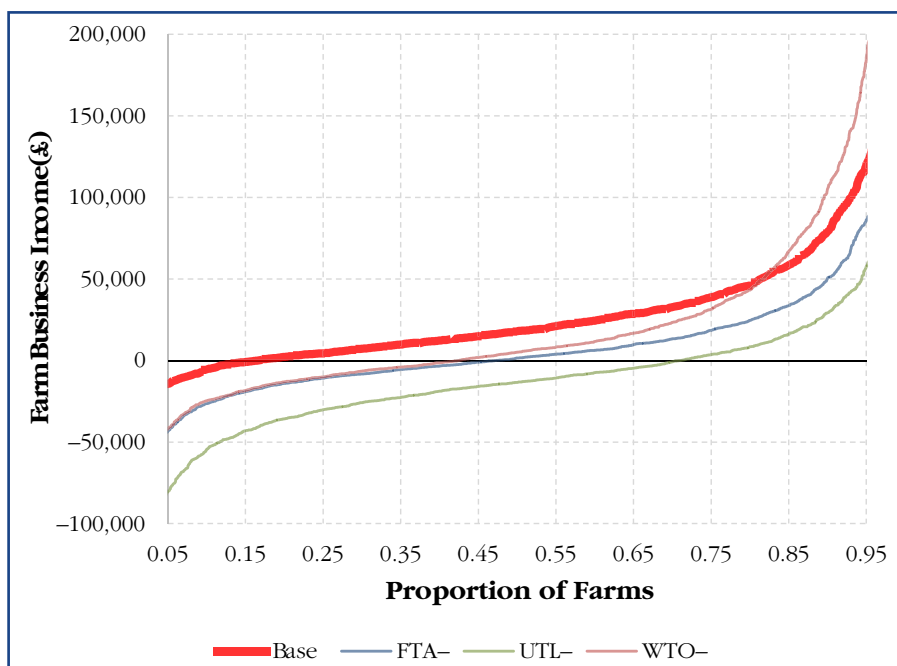


Figure 5: Farm income distribution by scenario without DPs, UK (2026)



“ Elimination of direct payments will affect most farm businesses ... but many beef and sheep farms would struggle to survive. ”

Our models do not address the economic impacts of Brexit on the supply chain *per se*, hence, it is difficult to predict exactly how these trade and domestic policy scenarios will affect the entire UK food supply chain, particularly consumers. However, UK food prices would depend not only on the tariff schedule that the UK will put in place and its impact on import supply (hence the importance of trade negotiations), but also on the value of the pound in foreign exchange markets. Continuing with EU level tariffs (without a free trade deal with the EU) would increase domestic food prices, particularly affecting those who spend a higher proportion of their disposable income on food; but ‘a hard’ Brexit (no deal with EU) and low (or no) tariffs could leave food prices unchanged or lower, so benefiting consumers, at least in the short term.



UK would be free and more flexible to negotiate new trade deals worldwide, given their importance and complexity this could be a lengthy and painful process. The Government seems confident that it will reconcile all of the above (see its response to the House of Lords, Defra, 2017), but who pays the bill remains to be seen.

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We might expect to see pressure from UK citizens for the application of British standards to imports from elsewhere.

Additionally, any exports from the UK to the EU and RoW would be required to meet the product and provenance standards of the importing country, while we might also expect to see pressure from UK citizens for the

application of British standards to imports from elsewhere. Trade (tariff and non-tariff) barriers also involve higher administrative costs which could disrupt the agri-food supply chain, at least for a period. While the

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Summary


Brexit: How Will UK Agriculture Fare?

 There is little doubt that Brexit would have significant implications for UK agriculture, a sector with strong trade links to the EU and strong reliance on CAP income support. This article reports preliminary results from employing a Computable General Equilibrium Model, a Partial Equilibrium Model and Farm Level Models to explore selected trade and domestic policy scenarios post-Brexit. These allow for the estimation of changes in producer prices, production and farm incomes against a baseline scenario of continued EU membership. Under a Free Trade Agreement with the EU, agricultural impacts are relatively modest. By contrast, unilateral removal of import tariffs has significant negative impacts on prices, production and incomes. Adoption of the EU's WTO tariff schedule for all imports favours net importers (e.g. dairy) and harms net exporters (e.g. sheep). Given the strong dependence of most UK farms on direct payments, their removal worsens negative impacts of new trade arrangements and offsets positive impacts. Impacts vary across different types and sizes of farm, but also regionally. However, the period of adjustment to new trade and domestic policy conditions may prove very challenging for a large number of farm businesses.

Brexit : Comment l'agriculture du Royaume-Uni va-t-elle réagir?

 Il ne fait guère de doute que le Brexit aura des répercussions importantes sur l'agriculture du Royaume-Uni, un secteur qui entretient des liens commerciaux solides avec l'Union européenne et qui dépend fortement du soutien au revenu de la PAC. Cet article présente les résultats préliminaires de l'utilisation d'un modèle d'équilibre général calculable, d'un modèle d'équilibre partiel et de modèles au niveau de la ferme pour explorer une sélection de scénarios de politique commerciale et intérieure après le Brexit. Ces scénarios permettent d'estimer les variations des prix à la production, de la production et des revenus agricoles par rapport à un scénario de référence de maintien de l'adhésion à l'Union européenne. Dans le cadre d'un accord de libre-échange avec l'Union, les impacts sur l'agriculture sont relativement modestes. En revanche, la suppression unilatérale des droits de douane à l'importation a des effets négatifs importants sur les prix, la production et les revenus. L'adoption de la liste tarifaire de l'Union européenne à l'OMC pour toutes les importations favorise les importateurs nets (par exemple le secteur laitier) et nuit aux exportateurs nets (par exemple le secteur ovin). Compte tenu de la forte dépendance de la plupart des exploitations britanniques vis-à-vis des paiements directs, leur suppression aggrave les effets négatifs des nouveaux accords commerciaux et neutralise les effets positifs. Les impacts varient selon les types et les tailles de fermes, mais aussi au niveau régional. Cependant, la période d'ajustement à de nouvelles conditions de commerce et de politique intérieure peut s'avérer très difficile pour un grand nombre d'entreprises agricoles.

Brexit: Wie wird es der Landwirtschaft des Vereinigten Königreichs ergehen?

 Es besteht kaum ein Zweifel, dass ein Brexit erhebliche Auswirkungen auf die britische Landwirtschaft hätte. Gründe hierfür sind die engen Handelsverbindungen zur EU und die große Abhängigkeit von der im Rahmen der GAP gewährten Einkommensstützung. Dieser Artikel zeigt die vorläufigen Ergebnisse ausgewählter handels- und innenpolitischer Post-Brexit-Szenarien. Sie wurden mit Hilfe eines allgemeinen Gleichgewichtsmodells, einem partiellen Gleichgewichtsmodell und mit Betriebsmodellen erstellt. Hierdurch können Änderungen in den Erzeugerpreisen, in der Produktion und im landwirtschaftlichen Einkommen im Vergleich zu einem Basisszenario mit fortbestehender EU-Mitgliedschaft abgeschätzt werden. Bei einem Freihandelsabkommen mit der EU sind die Auswirkungen auf die Landwirtschaft relativ gering. Dagegen hat eine unilaterale Abschaffung von Importzöllen erhebliche negative Auswirkungen auf die Preise, Produktion und Einkommen. Eine Einführung der EU-WTO-Zölle auf alle Importe begünstigt Nettoimporteure (z. B. Milchprodukte) und schadet Nettoexporteure (z. B. Schafe). Aufgrund der großen Abhängigkeit der meisten Betriebe im Vereinigten Königreich von den Direktzahlungen würde deren Abschaffung die negativen Effekte neuer Handelsregelungen verstärken und positive Auswirkungen aufheben. Je nach Art und Größe der Betriebe und auch je nach Region variieren die Auswirkungen. Die Übergangsphase, bei der die Anpassung an neue handels- und innenpolitische Rahmenbedingungen erfolgt, könnte sich jedoch für zahlreiche landwirtschaftliche Betriebe als sehr schwierig erweisen.