Alltech®

MYCOTOXIN MANAGEMENT

2022 European Harvest Analysis Report

Mycotoxin insights to empower your nutritional strategy

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Introduction

Turbulent weather set to impact this year's crop quality

Welcome to the Alltech 2022 European Harvest Analysis report, a full and detailed breakdown of the data gathered from this year's programme. This document is the culmination of months of work collecting and analysing over 1,000 grain and forage samples from across Europe. It is a comprehensive resource, providing you with the most relevant mycotoxin insights to empower your nutritional strategy.

In these pages, we will help you understand the contamination risk across the continent and make the most effective management decisions when it comes to feeding grains and silages over the coming months. By highlighting key regional and animal-specific concerns, you can use this report to pinpoint the potential challenges relevant to your area and species, enabling you to actively tailor your approach in combatting mycotoxins.

Utilising Alltech's primacy in science and drive to support global agriculture, we are sure this report will prove a vital resource in elevating your feeding and production efficiency.

Yours sincerely,

Patrick Charlton, vice president of Europe, Alltech

How mycotoxins impact animals

Reduced feed intake impacting milk and meat production

Damage to intestines and internal organs

Compromised rumen function and volatile fatty acid production

Immune suppression

Infertility and reproductive challenges

General overview

Similar to what was witnessed in 2021, prolonged drought is the dominant factor shaping this year's mycotoxin risk patterns. Corn produced in Central and Southeastern Europe has been found to be heavily contaminated with aflatoxins, presenting particular challenges to livestock producers not only in this region but any part of the worldwide export market. To act both early and effectively, European feed and livestock producers must first understand their region's mycotoxin landscape in order to get an accurate idea of what they are up against.

Continued collaboration with SGS

Alltech is again working with SGS, a world leader in mycotoxin testing services, to expand the reach of this year's European Harvest Analysis by collecting and analysing corn samples for Central-Southeast Europe. Combining these resources with findings from our Alltech 37+® mycotoxin analysis allows us to continue to deliver a robust assessment of the mycotoxin landscape right across the continent.

Key insights

Moderate to high mycotoxin risk in 2022

Testing indicates a moderate to high overall mycotoxin risk from this year's harvested crops.

20
Countries analysed across Europe

Sample date range: 1/8/2022 – 2/12/2022

>1,000
Samples tested in total between Alltech 37+® and SGS

4.4
Average number of mycotoxins per sample

Figure 1: 2022 Alltech® European Summer Harvest Survey key figures

The final mycotoxin risk will ultimately depend on the animal species and groups being fed and the mycotoxin concentrations and combinations in the finished diet.

What are this year's key insights?

Widespread drought impacting crop yield and quality

Throughout the crop-growing season, drought has been detrimental to crops across all of Europe and has been instrumental in the dominance of the aflatoxin issue. **Aflatoxin is a warm-weather toxin, and the widespread extreme heat conditions during the main growing season are likely to have contributed to the levels exceeding EU regulatory feed limits appearing in corn samples.** This data is especially relevant for the dairy industry due to the risk of aflatoxin transfer from the cow through the milk supply. A multi-faceted approach, engaging all steps along the supply chain, is necessary to tackle this challenge.

Stay vigilant with small grains

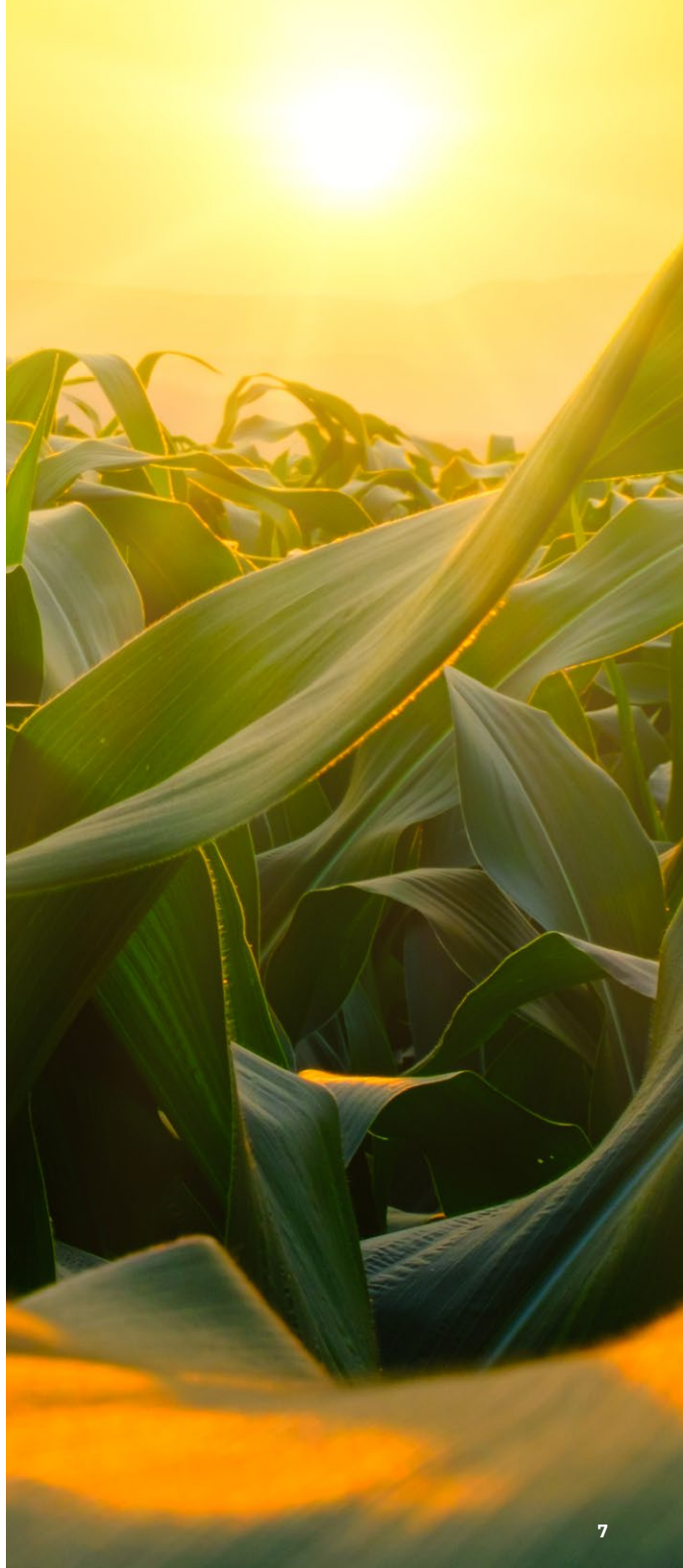
Small grain samples (wheat, barley) show a unilateral low risk across the continent, only presenting around half the mycotoxin levels of corn. But 'low risk' does not mean 'no risk,' as research shows that prolonged exposure to mycotoxins can harm livestock even at low levels. Equally, although the overall average is lower, many individual samples will still pose a higher risk. Producers must still consider to develop a plan to combat the issue.

Contamination in straw continues to rise

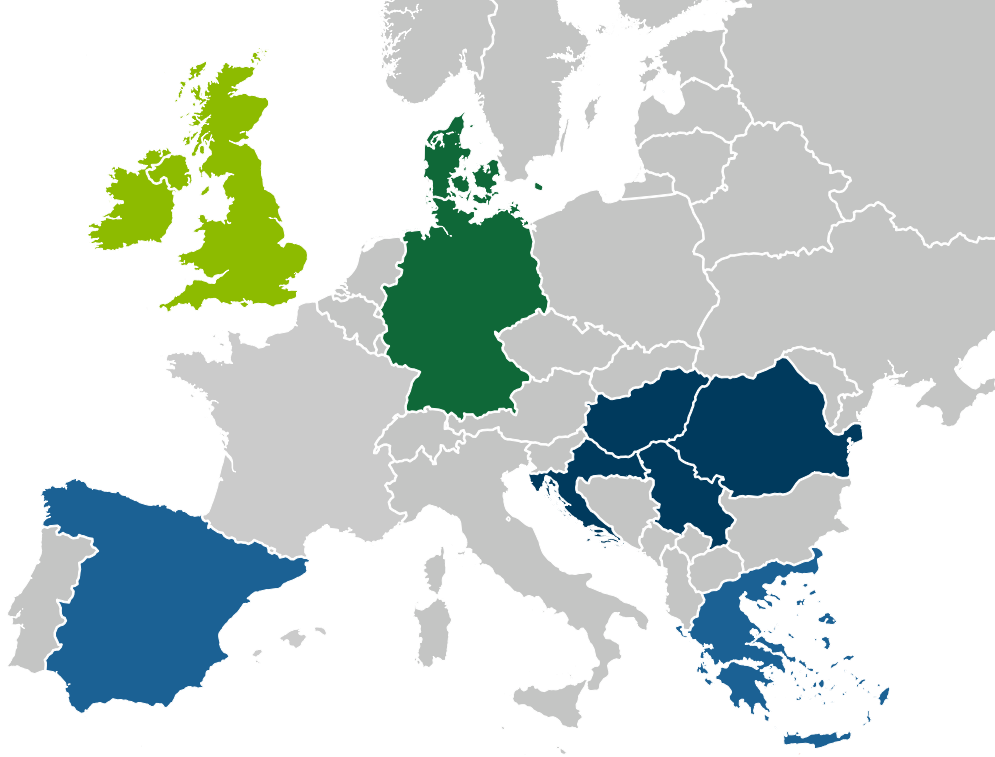
Building on first-time insights gathered last year, we can see that **Danish straw samples continue to reveal higher levels of mycotoxins**. **Deoxynivalenol (DON) is the leading mycotoxin of concern** and likely results from a combination of pre- and post-harvest contamination. The problem can be exacerbated when straw is left in the field or stored outdoors for a prolonged period, exposed to rain and dampness.

Do repeating trends indicate future issues?

Many of the findings of the 2022 testing mirror or further information gained at the same time in 2021. **This indicates that instead of the current challenges resulting from seasonal anomalies and one-off events, they are caused by repeated and sustained weather and climate conditions**. Moving forward, we could potentially see these issues return and develop, forming a new normal for the mycotoxin landscape.



A look around some of the regions



Romania, Serbia, Hungary and Croatia

Corn samples in each of these countries were found to contain aflatoxin levels above 20 ppb, exceeding EU regulatory limits for animal feeds. The maximum aflatoxin B_1 concentration detected this year was 239 ppb in a Hungarian corn sample.

Spain and Greece

Corn samples in these countries were analysed with Alltech 37+. The average number of mycotoxins per sample was seven, while 100 per cent of samples contained two or more mycotoxins. Emerging mycotoxins, fusaric acid and fumonisins were the dominant mycotoxin types detected. Although aflatoxin B_1 occurrence is lower in these two countries, one sample in Spain did contain 451 ppb.

Denmark and Germany

Testing in Germany focused on small grains (wheat and barley). Germany was the country which showed the greatest occurrence of ergot toxins, being present in 20 per cent of samples, with a maximum level of 2,891 ppb in a barley sample. Straw once again presents notable challenges in Denmark, with over 50 per cent of samples deemed higher risk when Alltech's REQ metric is applied. Emerging mycotoxins and type B-trichothecenes are the dominant toxins found in straw.

UK and Ireland

Grass silage and small grains represented the largest number of samples from the UK and Ireland. In grass silage, the widespread occurrence of *Penicillium* toxins has significantly elevated the risk levels. This is a similar picture across other markets that have tested forages. In wheat and barley, although there is a 100 per cent occurrence of emerging mycotoxins, the overall risk levels are low.

Corn

The multiple mycotoxin challenge in this year's corn

Summary of results from Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Serbia, Slovakia and Ukraine

3.8
mycotoxins per sample on average

0-6
Number of mycotoxins range

100%
Samples containing mycotoxins

61.8%
Samples with 2 or more mycotoxins

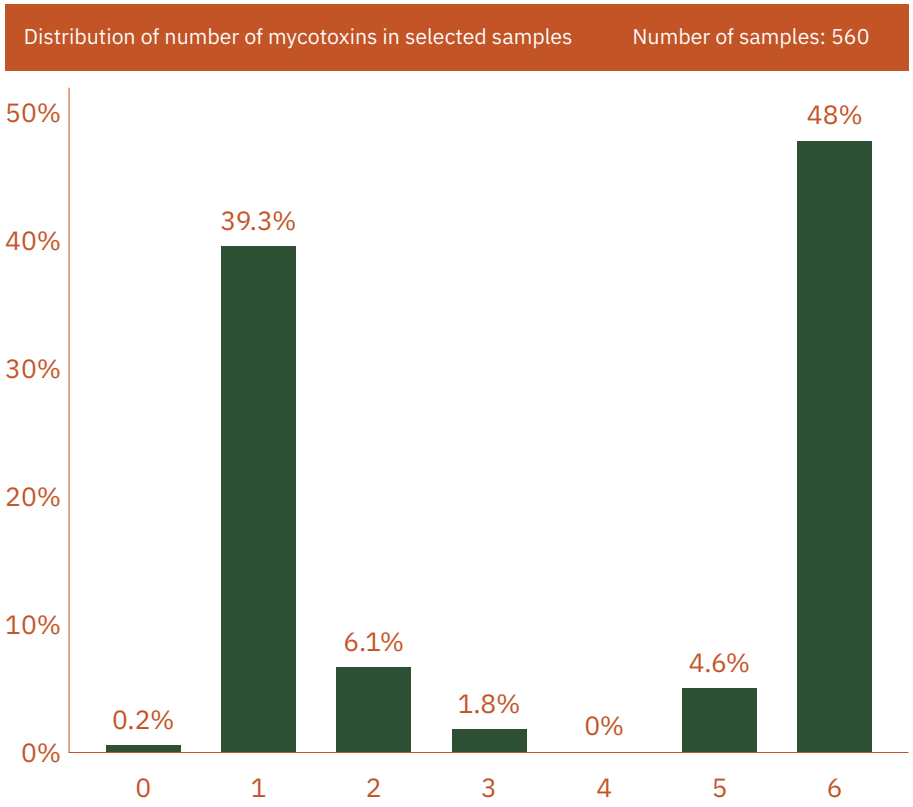


Figure 2: The multiple mycotoxin risk in corn samples. Analysed by SGS.

Occurrence and concentrations of mycotoxins in this year's corn samples

Summary of results from Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Serbia, Slovakia and Ukraine

Number of samples: 560

Mycotoxin group occurrence %	
Aflatoxins, total	54
Ochratoxins/Citrinin	29
Type B-trichothecenes	7
Type A-trichothecenes	5
Fumonisins	27
Zearalenones	2

Average concentrations of mycotoxins by mycotoxin group, ppb	
Aflatoxins, total	16
Ochratoxins/Citrinin	21
Type B-trichothecenes	550
Type A-trichothecenes	100
Fumonisins	1,455
Zearalenones	97

Maximum concentrations of mycotoxins by mycotoxin group, ppb	
Aflatoxins, total	164
Ochratoxins/Citrinin	172
Type B-trichothecenes	1,500
Type A-trichothecenes	217
Fumonisins	7,998
Zearalenones	249

Figure 3: Key results for corn samples, please see page 29 for a note on the limits of quantification (LOQ) used.

The multiple mycotoxin challenge in corn samples from Spain and Greece

7.0
mycotoxins per sample on average

2-11
Number of mycotoxins range

100%
Samples containing mycotoxins

100%
Samples with 2 or more mycotoxins

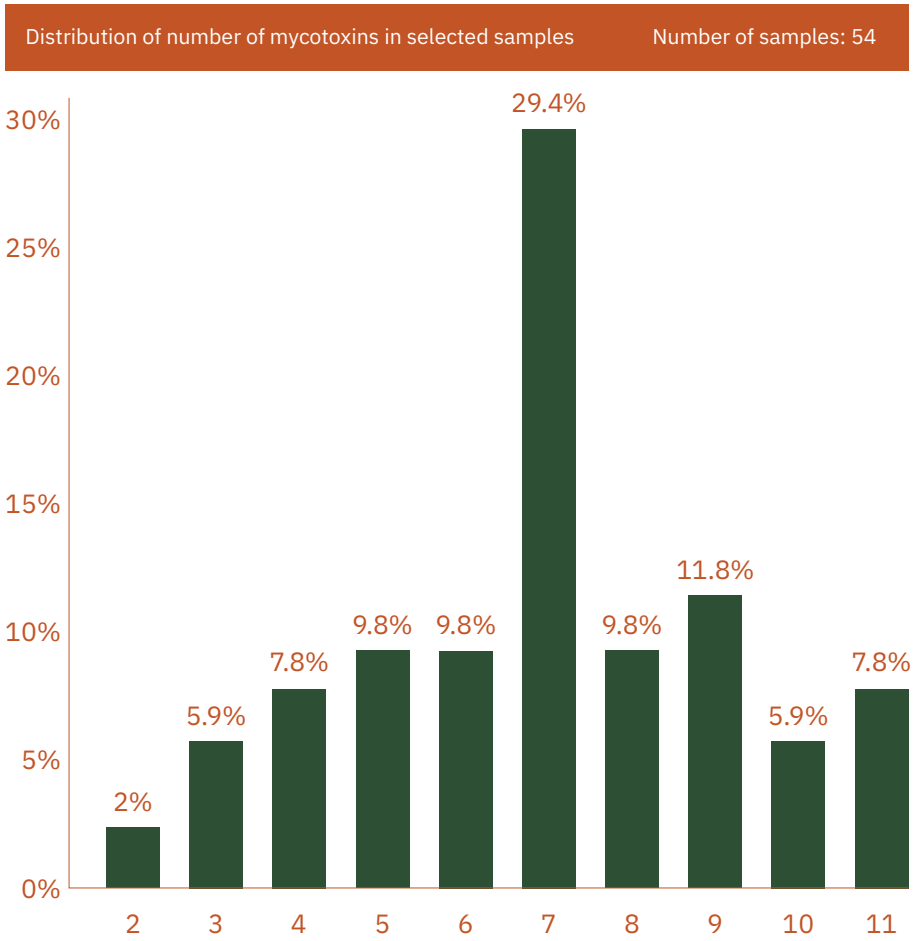


Figure 4: The multiple mycotoxin risk in corn samples from Spain and Greece. Analysed by Alltech 37+

Occurrence and concentrations of mycotoxins in corn samples from Spain and Greece

Number of samples: 54

Mycotoxin group occurrence %	
Aflatoxins B_1	8
Aflatoxins, total	8
Ochratoxins/Citrinin	2
Type B-trichothecenes	43
Type A-trichothecenes	2
Fumonisins	63
Zearalenones	14
Fusaric acid	86
Emerging mycotoxins	100
Other Penicilliums	8
Other Aspergillus	4

Average concentrations (ppb) of mycotoxins in all samples	
Aflatoxins B_1	8.6
Aflatoxins, total	8.9
Ochratoxins/Citrinin	0.5
Type B-trichothecenes	314
Type A-trichothecenes	1
Fumonisins	1,815
Zearalenones	44
Fusaric acid	188
Emerging mycotoxins	683
Other Penicilliums	6
Other Aspergillus	1

Maximum concentration of mycotoxins by mycotoxin group (ppb)	
Aflatoxins B_1	451
Aflatoxins, total	466
Ochratoxins/Citrinin	29
Type B-trichothecenes	3,421
Type A-trichothecenes	53
Fumonisins	17,722
Zearalenones	1,198
Fusaric acid	2,050
Emerging mycotoxins	4,649
Other Penicilliums	168
Other Aspergillus	20

Figure 5: Key results for corn samples from Spain and Greece, please see page 29 for a note on the LOQs used.

How will this impact species and animal groups?

The average levels of mycotoxins identified are below the EU recommendation for each mycotoxin when assessed individually. However, the risk level for productive species based on Alltech's REQ* varies from moderate to high when considering the multiple mycotoxin challenge.

Based on average Risk Equivalent Quantity (REQ):

Risk for dairy cows is low

Risk for grow/finish pigs is low to moderate

Risk for broilers is low to moderate

*REQ: A measurement of the cumulative impact of mycotoxins in reference to aflatoxin B_1

Figure 6: Analysis of the REQ for corn samples

Alltech PROTECT™: Assessing the impact of mycotoxins on animal productivity

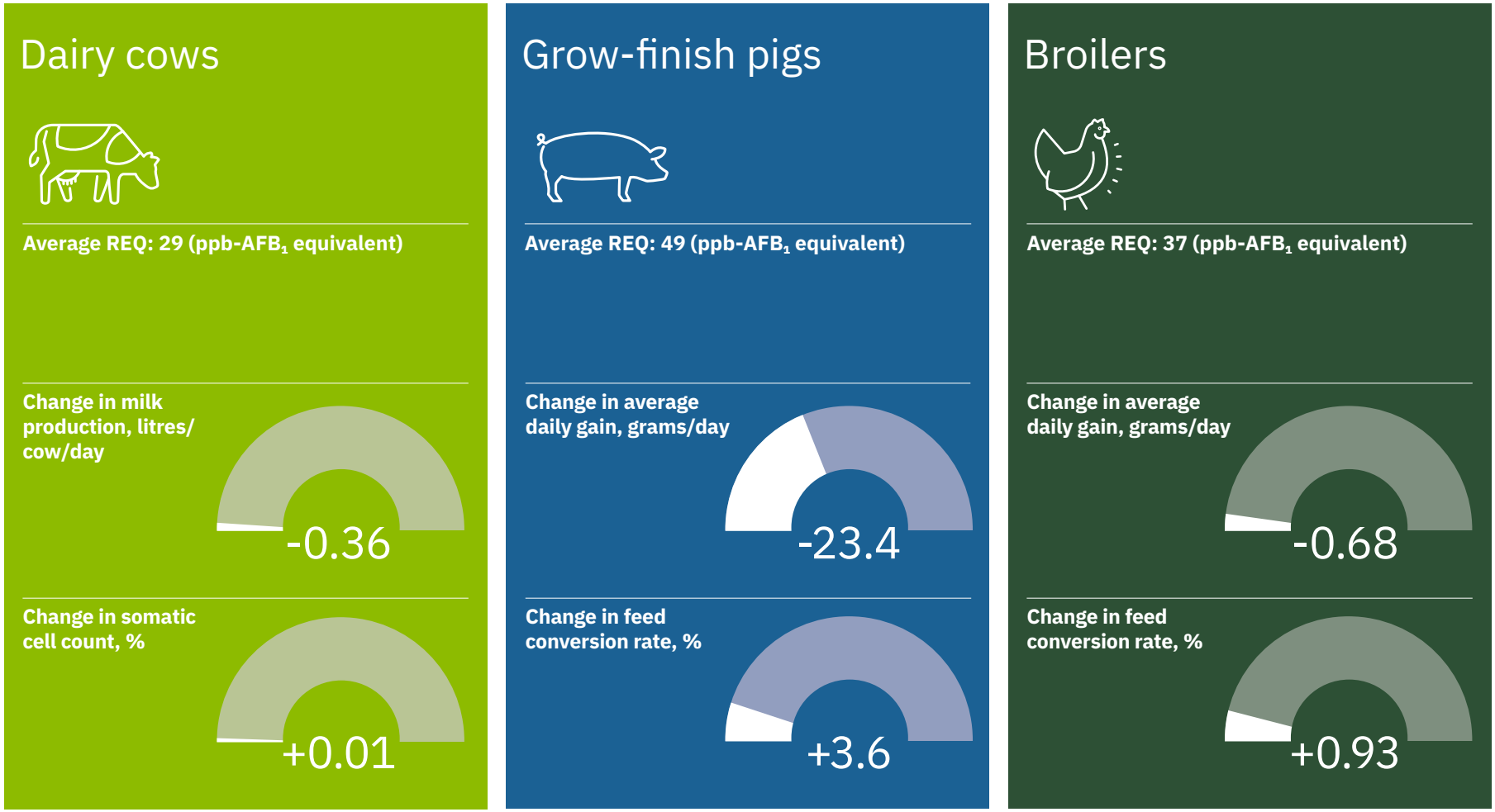


Figure 7: The performance effects of mycotoxin contamination in corn

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Wheat & Barley

The multiple mycotoxin challenge in this year's wheat and barley

Summary of all results from Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Republic of Ireland and Russia

3.7
Mycotoxins per sample on average

0-13
Number of mycotoxins range

99.5%
Samples containing mycotoxins

97.5%
Samples with 2 or more mycotoxins

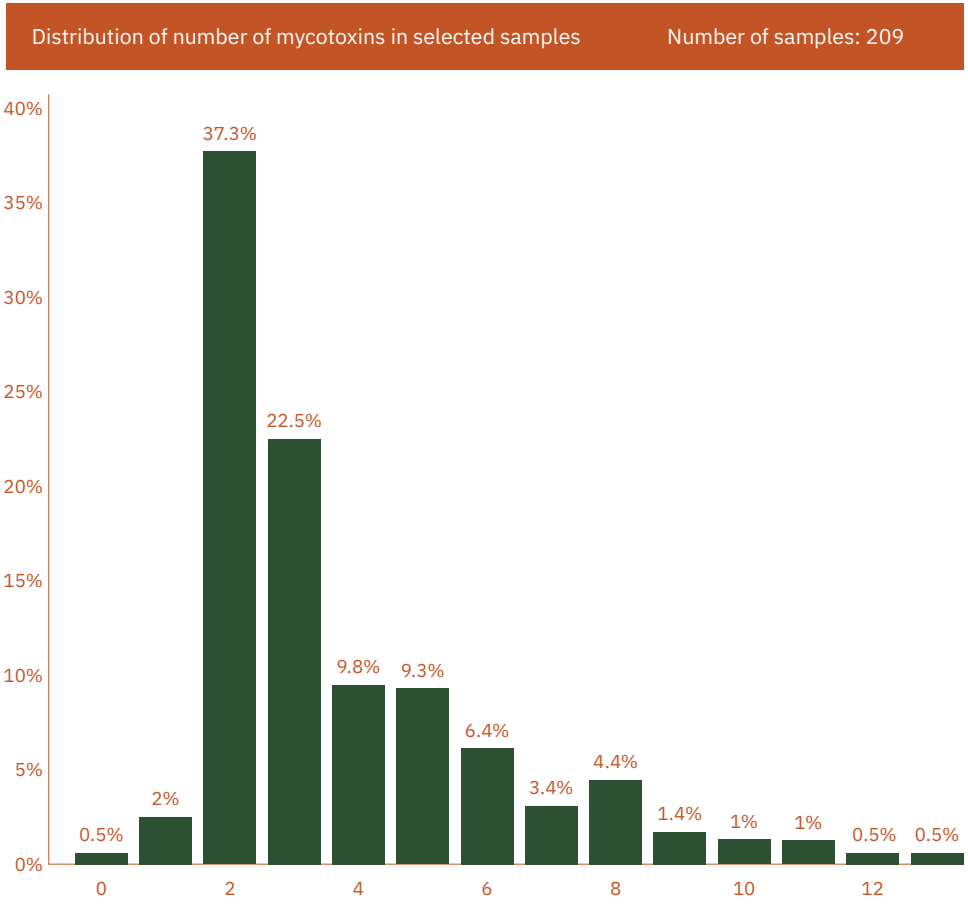
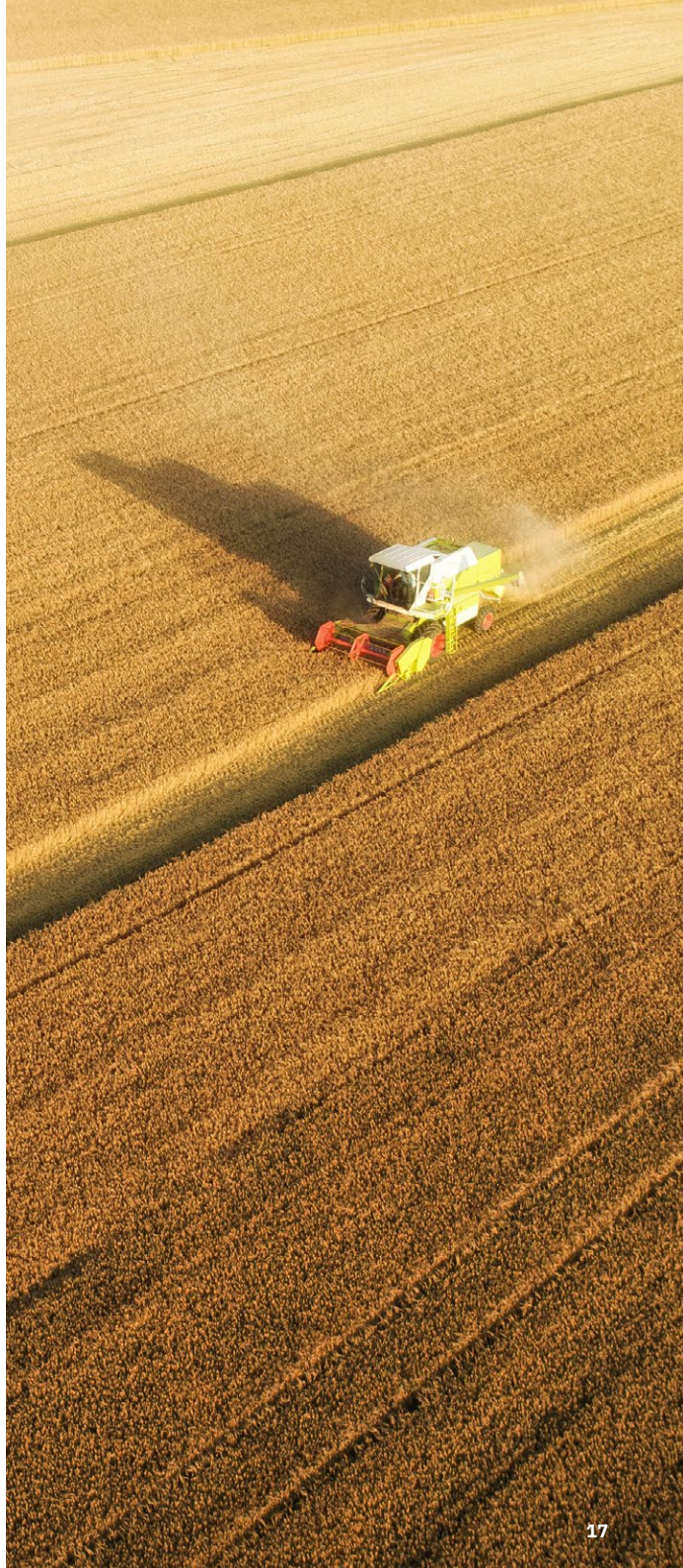


Figure 8: The multiple mycotoxin challenge in wheat and barley samples



Occurrence and concentrations of mycotoxins in this year's wheat and barley samples

Summary of all results from Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Republic of Ireland and Russia

Number of samples: 209

Mycotoxin group occurrence %	
Aflatoxins, total	0
Ochratoxins/Citrinin	0
Type B-trichothecenes	35
Type A-trichothecenes	30
Fumonisins	1
Zearalenones	2
Fusaric acid	1
Emerging mycotoxins	100
Other Penicilliums	1
Other Aspergillus	0
Ergot Toxins	7

Average concentrations (ppb) of mycotoxins in all samples	
Aflatoxins, total	0
Ochratoxins/Citrinin	0
Type B-trichothecenes	64
Type A-trichothecenes	16
Fumonisins	0
Zearalenones	0
Fusaric acid	3
Emerging mycotoxins	152
Other Penicilliums	1
Other Aspergillus	0
Ergot toxins	35

Maximum concentration of mycotoxins by mycotoxin group (ppb)	
Aflatoxins, total	0
Ochratoxins/Citrinin	0
Type B-trichothecenes	1,673
Type A-trichothecenes	388
Fumonisins	16
Zearalenones	27
Fusaric acid	548
Emerging mycotoxins	2,592
Other Penicilliums	253
Other Aspergillus	4
Ergot Toxins	2,891

Figure 9: Key results for wheat and barley samples, please see page 29 for a note on the LOQs used.

How will this impact species and animal groups?

The average levels of mycotoxins identified are below the EU recommendation for each mycotoxin when assessed individually. However, the risk level for productive species based on Alltech's REQ varies from low to moderate when considering the multiple mycotoxin challenge.

Based on average Risk Equivalent Quantity (REQ):

- Risk for dairy cows is low
- Risk for grow/finish pigs is low to moderate
- Risk for broilers is low

Figure 10: Analysis of the REQ for wheat and barley samples

Alltech PROTECT™: Assessing the impact of mycotoxins on animal productivity

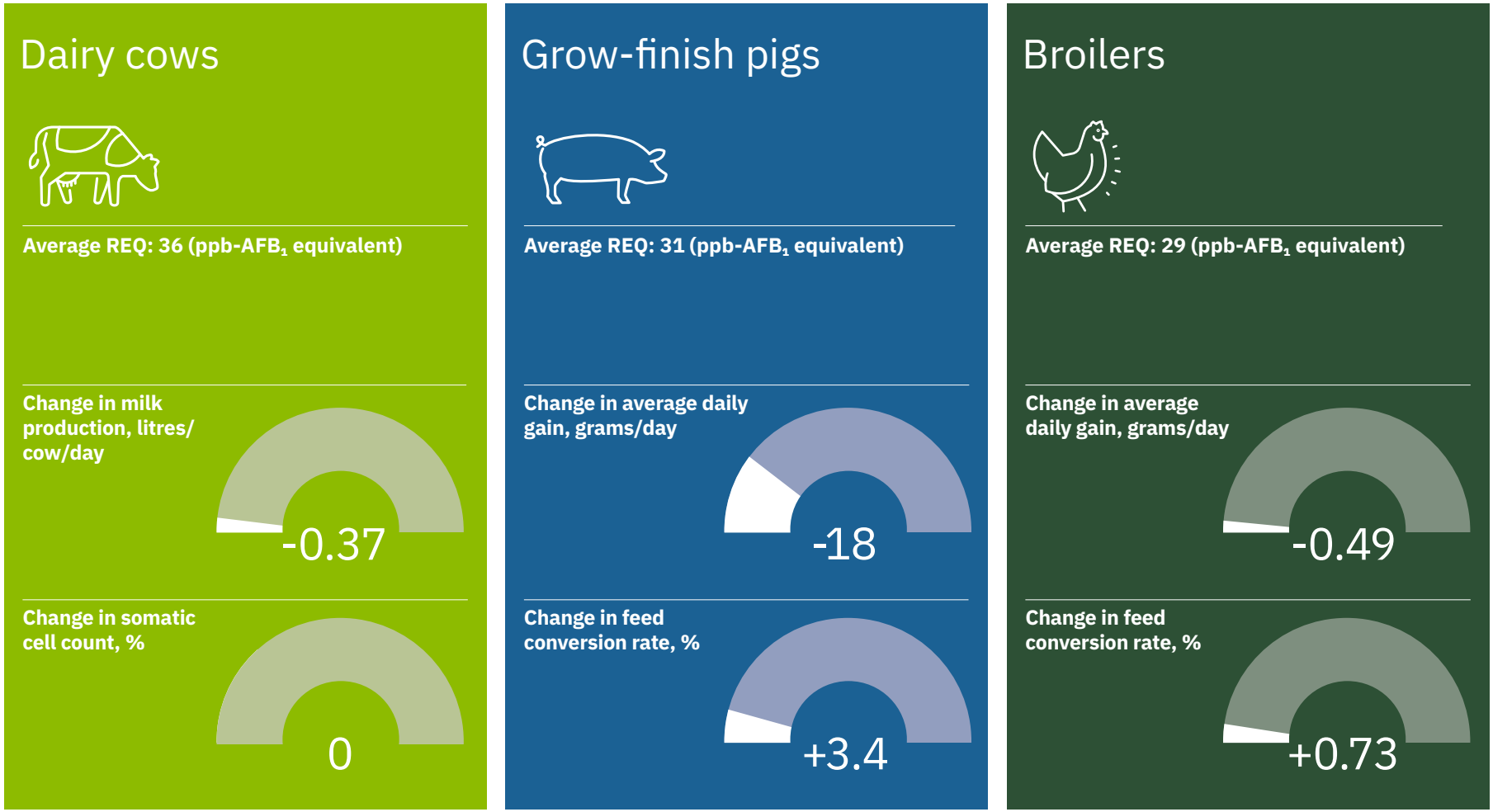


Figure 11: The performance effects of mycotoxin contamination in wheat and barley

Forages

A look at the mycotoxin risk in forages

This year's analysis program also contains information about mycotoxin contamination of forages. We have analysed 151 samples of corn silage, grass silage and pea silage across Europe. *Penicillium* toxins continue to be the biggest cause of concern in forages. Results from the forage samples analysed so far indicate a moderate to high risk in dairy cows, beef cattle and heifers.

Summary of results for all forages tested across Europe

Sample region:
Europe

Sample date range:
9/7/2022 – 15/11/2022

151
Samples tested by Alltech 37+®

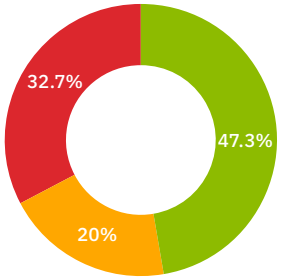
5.4
Average number of mycotoxins per sample

99%
Percentage of samples with two or more mycotoxins

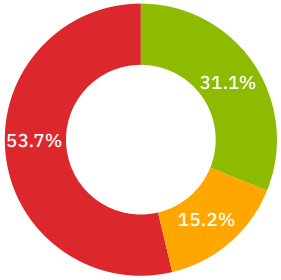
Figure 12: Key results for forage samples

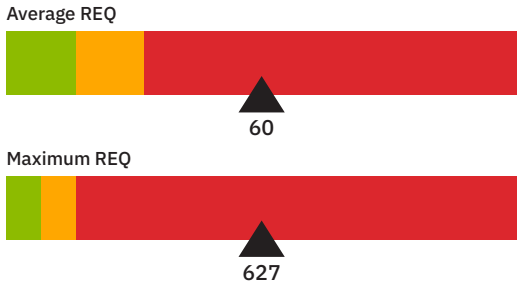
The impact on the animals

% of samples at lower, moderate or higher risk REQ for **Beef cattle**

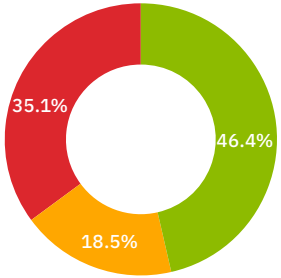


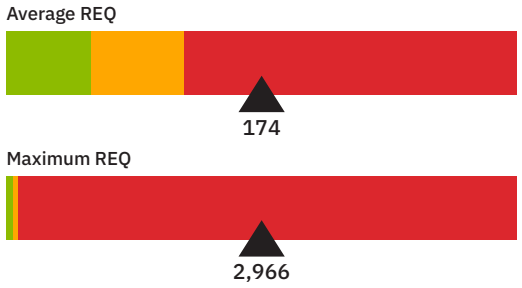
% of samples at lower, moderate or higher risk REQ for **Calves/Heifers**





% of samples at lower, moderate or higher risk REQ for **Dairy cows**





Dairy cows

Average REQ: 181 (ppb-AfB_1 equivalent)

Change in milk production, litres/cow/day

Change in somatic cell count, %

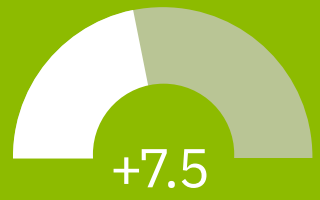


Figure 13: An analysis of the REQ for forage samples

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Sustainability

Sustainability suffers under a mycotoxin challenge

A mycotoxin challenge leads to more than just risks to animal health and production profits. By combining mycotoxin contamination data with the impacts on animal health and performance, we are learning more about how mycotoxins also contribute to the overall carbon footprint of an agricultural operation — the greater the scale of the challenge, the greater the impact.

With the services of **Alltech E-CO_2**, we have uncovered the environmental threat posed by mycotoxins in European feed ingredients, enabling us to understand better how we may be able to manage a challenge that is becoming more and more relevant to European producers.

How we measure the environmental footprint associated with mycotoxin contamination

Mycotoxin contamination	Risk Equivalent Quantity (REQ)	Animal performance (Alltech PROTECT™)	Alltech E-CO_2

125-cow dairy, average production of 8,000 litres per cow per year

	Wheat/Barley diet (Moderate risk)		Corn diet (Higher risk)	
	Difference from baseline	% difference	Difference from baseline	% difference
Emissions intensity (g CO_2e/kg FPCM)	43.8	3.41	42.7	3.33

The difference in emissions intensity (g CO_2e/kg FPCM) between the baseline and a diet containing mycotoxins is equivalent to:

Flights around the world

Cars off the road for a year

For a baseline farm finishing 18,783 pigs finished across a 179-day period

	Wheat/Barley diet (Moderate risk)		Corn diet (Higher risk)	
	Difference from baseline	% difference	Difference from baseline	% difference
Finished pig, emissions per kg LW (kg CO_2e)	0.05	1.53	0.14	3.99

The difference in intensity per kg emissions (kg CO_2e /kg/ lw) between the baseline and a diet containing mycotoxins is equivalent to:

Flights around the world

Cars off the road for a year

For the production of 1,000 tonnes liveweight (LW), across a 37 day finishing period

	Wheat/Barley diet (Moderate risk)		Corn diet (Higher risk)	
	Difference from baseline	% difference	Difference from baseline	% difference
Total emissions (kg CO_2e)	79.97	0.002	79.97	0.002

The difference in total emissions kg (CO_2e) between the baseline and a diet containing mycotoxins is equivalent to:

Flights around the world	40.3	40.3
Cars off the road for a year	22.6	22.6

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Mycotoxin control solutions

A proven program from Alltech® Mycotoxin Management

Alltech believes that effective mycotoxin management is about seeing the whole challenge, from the farm to the feed mill and from risk assessment to feed management. To effectively manage the inevitability of feed mycotoxin contamination, it is crucial to understand the level of mycotoxin challenges so that the right steps can be taken to mitigate any adverse effects on animal performance, production efficiency and food safety.

Learn more about **Alltech® Mycotoxin Management,** our services and solutions and the latest information on the threat of mycotoxins at **knowmycotoxins.com.**

01	02	03	04	05
Risk **education**	Risk **identification**	Risk **quantification**	Risk **mitigation**	Risk **evaluation**
Harvest analysis programs Podcasts and media knowmycotoxins.com	Alltech 37+® Alltech RAPIREAD®	Mycotoxin Management Portal Alltech PROTECT™ (REQ) Alltech DIET™ Estimator	Mycosorb® family of mycotoxin adsorbents	Mycotoxin technical team On-farm support Feed mill services

The mycotoxin testing methods used across both the Alltech 37+ and SGS laboratories will differ and utilise separate limits of quantification (LOQ). The mycotoxin occurrence numbers in corn, reported on page 11 are based on a higher LOQ than the corn data on page 13, and the wheat and barley data on page 18.

For more information, please contact our office:

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