NFU Briefing

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NFU Biodiesel Survey Report

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Background

From late July 2019, both the NFU and NFU Scotland (NFUS) have received numerous reports from members of issues surrounding fuel filter blockages. The exact causes of the problem have not yet been identified.

The NFU has had sight of fuel test reports which record that:

- Fuel samples and filter samples tested all meet BS 2869 or EN 590 specification with water content and microbial material within tolerances
- Some samples show an elevated level of glycosides and monglycerides

The NFU and NFUS have taken steps to gather information and data on the scale and nature of the problem, as well as entering into discussions with the Department for Transport (DfT) and various industry stakeholders to identify potential resolutions. In order to better understand the depth and geographical extent of filter blocking problems a research survey was launched on 6 December 2019 to collect further information.

Method

A survey was published on 6 December 2019 on the NFU online website. All sectors of the agricultural industry were invited to record fuel quality and filter blocking problems experienced using the survey. The survey was publicised through NFU and NFUS media channels (website, newsletters, twitter and British Farmer & Grower magazine) and responses were invited from farmers, agricultural contractors and others within England, Scotland and Wales. The survey questions were drafted after discussion between NFU, NFUS and the DfT.

Sample Information

This report refers to 430 respondents who completed the survey on or before 31 December 2019 and who suspected their machinery or vehicle breakdown was due to the biodiesel content of red diesel blocking the engine filter. There were too few responses from Wales to be able to make a reliable comparison with other breakdown locations.

Executive Summary

Circumstances of Breakdown

Overall 67% of respondents reported breakdowns happening between October and December 2019.

Breakdowns occurred at different temperature ranges and don't appear to be prompted by extremes. However, breakdowns that occurred within 15 minutes of engine start-up, or where the engine couldn't be started at all, seem to happen more often in lower temperatures. 47% of breakdowns reported in Scotland, where the average reported temperature at time of breakdown was 3.3°C, happened within 15 minutes of start-up or where the engine would not start at all. This can be compared with 20% of breakdowns in England, where the average reported temperature at the time of breakdown was 11.8°C.

Vehicle

The most commonly mentioned makes of machine were John Deer (24.5%), Massey Ferguson (14%) and New Holland (10%).

Any correlation between vehicle make and breakdown occurrence may reflect the market share of these agricultural machinery producers.

From a base of 189 respondents who supplied the age of the affected vehicle, 60% of responses reported the affected vehicle to be ≤ 5 years old and 78% reporting a vehicle ≤ 10 years old. Of these vehicles, the average year of registration was 2016.

Fuel

The most commonly mentioned fuel suppliers were Certas (14% in England). Chrystal was the supplier most mentioned in Scotland (9%). A significant number of respondents did not record the fuel supplier (39% in England and 38% in Scotland)

In England, 42% of respondents who reported breakdowns had their fuel deliveries two weeks prior to breakdown. This fuel delivery timescale compares with 19% of breakdowns in Scotland.

There are no statistically significant differences between the appearance of diesel at the time of breakdown in comparison to the approximate fuel delivery time.

35% of respondents in Scotland reported that fuel appeared cloudier than normal at the time of breakdown, which indicates some degree of waxing, perhaps due to the colder temperatures. The majority of respondents in England (42%) reported fuel appeared visually normal at the time of breakdown.

Filter

71% of engine filters were changed within 3 months prior to the breakdown.

Of respondents in Scotland, 45% said that the filter residue appeared waxy/thick and 38% said the residue was clear or white in appearance.

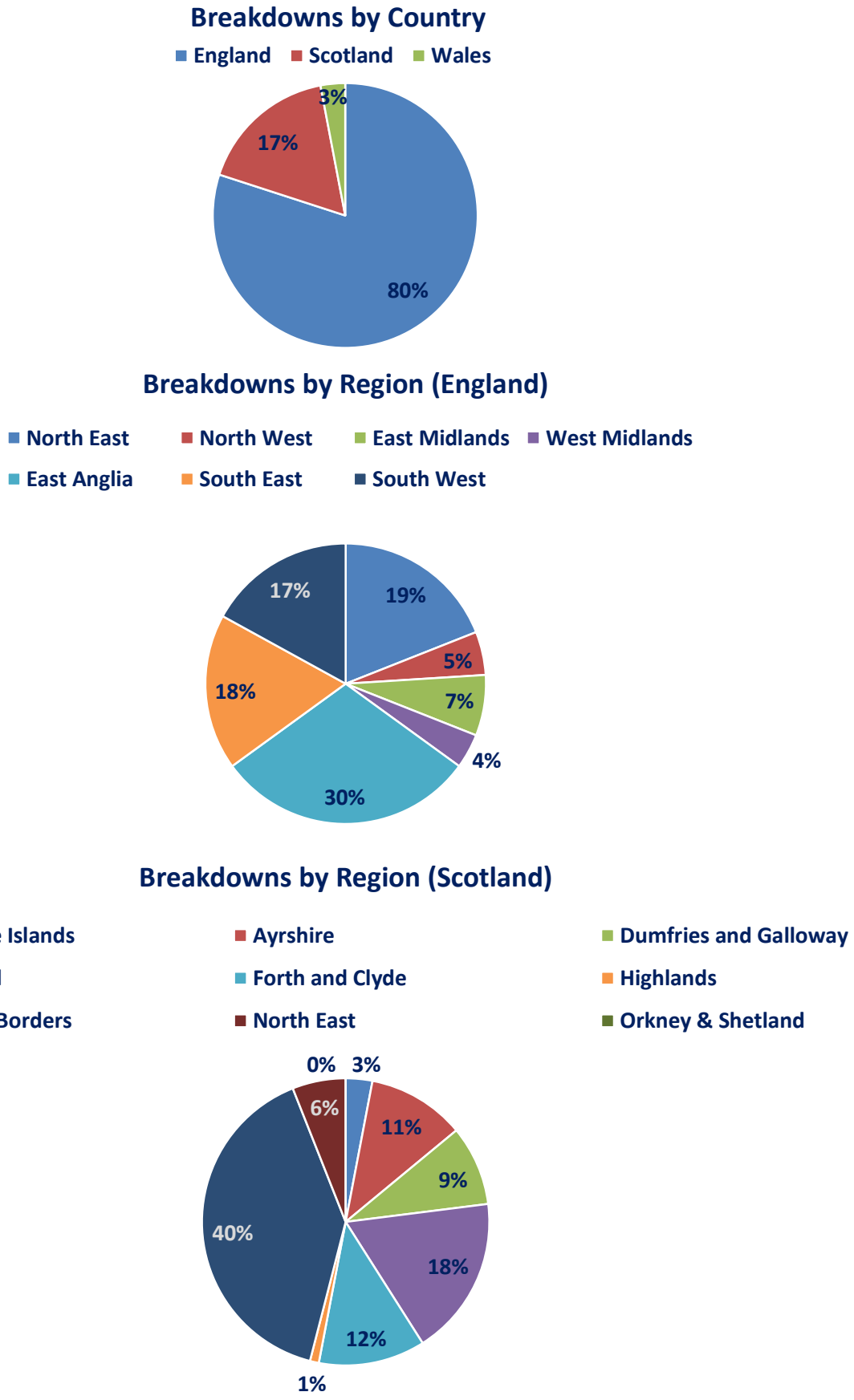
Of respondents in the North East of England, 42% said that the filter residue appeared waxy/thick and 23% said the residue was black in colour.

Of respondents in East Anglia, 35% said there was no visible residue on the filter. 25% said that there was a residue of slimy appearance and 21% said that there was a residue that was black in colour.

Where the colour of the filter appeared clear or white, 52% said the filter appeared waxy or thick. Where the filter was brown in colour, 51% said the filter appeared slimy. Of the 46% who reported the filter as black, the filter also appeared slimy.

Survey Results Breakdown by location

Figure 1



The majority of responses to the survey occurred in England, although this does not necessarily mean that the majority of break downs did occur in England as:

- The higher number of responses from England may be the result of wider publicity of the survey over a longer time period to NFU members in England compared with Scotland.

- Farmers in Scotland may not have seen the need to complete the on-line survey as extensive incident reporting direct to NFUS staff had taken place prior to the launch of the survey on 6 December 2019. NFUS had recorded circa 450 filter blocking reports from their members prior to the launch of the survey.

England

Within England, a majority of breakdowns were reported in East Anglia (30%), followed by the North East region (19%). Large numbers of breakdowns were also reported in both the South East and South West regions, with only small numbers of reports coming from elsewhere across England. East Anglia and the North East are the only regions within the UK not serviced by an oil refinery, instead largely relying on fuel deliveries from fuel terminals. Throughout the rest of this report, results from East Anglia and the North East have been singled out and compared to results from England as a whole, due to the significance of these regions.

Scotland

Within Scotland, the largest proportion of fuel filter issues were reported in the Lothians and Borders region (40%), the location of the Petroineos Grangemouth refinery and the Grangemouth fuel terminals. Of the breakdowns reported outside of the Lothians and Borders region, the majority were reported in regions in southern Scotland.

Wales

The number of survey responses from Wales was too small to be able to draw any accurate conclusions; therefore throughout the rest of this report data from Welsh responses is not reported.

Survey results by month

Figure 2

Breakdown location by month (%)						
	Jan to June 2019	Jul/Aug 2019	Sept 2019	Oct 2019	Nov 2019	Dec 2019
Scotland	/	1.4	9.5	14.9	54.1	20.3
England - East Anglia	1.9	31.1	20.4	12.6	19.4	14.6
England - North East	1.6	17.2	10.9	7.8	35.9	26.6
England - Whole	2.9	23.3	12.2	16.6	25.6	19.5

The NFU started receiving reports through the CallFirst NFU helpline of unusual fuel filter blockages in late July 2019. The number of reports received increased through the late summer into autumn, possibly coinciding with increased levels of machinery activity during the harvest season.

The vast majority of responses from Scotland were received in November (54.1%), as temperatures decreased. This raised questions about the cold weather performance quality of fuel being supplied to southern Scotland.

The number of responses lessened into December, although this is likely to be influenced to some degree by the reduction in work intensity within the agricultural industries through December.

Figure 3

Time after start-up of breakdown by location (%)						
	> 2 hrs	1 – 2 hrs	15 mins – 1 hr	< 15 mins	Machine/vehicle would not start	Unsure
Scotland	16.2	17.6	16.2	32.4	14.9	2.7
England - East Anglia	44.7	30.1	8.7	6.8	2.9	6.8
England - North East	26.6	20.3	21.9	23.4	6.3	1.6
England - Whole	36.0	22.7	16.6	11.6	7.6	5.5

A difference between fuel issues experienced in England and Scotland became apparent when investigating the point at which a vehicle/machine experienced engine failure due to a blocked fuel filter.

Across the whole of England, the majority of breakdowns occurred after more than 1 hour after start-up (58.7 %). However, in Scotland the majority of breakdowns occurred within 15 minutes of start-up. There were very few instances where an engine would not start at all, although this was more common in Scotland.

Fuel

Figure 4

Delivery of fuel in question (approx.) (%)						
	> 3 months ago	> 2 months ago	> 1 month ago	> 2 weeks ago	> 1 week ago	Within last 7 days
Scotland	13.5	13.5	24.3	27.0	8.1	10.8
England - East Anglia	2.9	8.7	16.5	24.3	20.4	23.3
England - North East	7.8	15.6	29.7	14.1	10.9	21.9
England - Whole	6.1	10.5	20.6	19.5	15.1	26.7

Strong conclusions cannot be drawn from the relationship between breakdown occurrence and length of time since fuel delivery; frequency of fuel delivery varies according to a number of factors including size and type of farming business (e.g. livestock, arable, horticultural). However, it is clear the majority of breakdowns occurred when using fuel that had been stored on-farm for less than 2 months, indicating that poor housekeeping may not be an overriding reason for poor fuel quality.

There are generally few reported breakdowns using fuel that had been stored on-farm for more than 2 months. This limits the number of breakdowns that may have been due to the use of summer-grade fuel after the 1st October.

Figure 5

Appearance of diesel at time of breakdown (%)					
	Cloudier than normal	Darker than normal	Lighter than normal	Normal	Unsure
Scotland	35.1	5.4	2.7	18.9	37.8
England - East Anglia	8.7	4.9	1.9	49.5	35.0
England - North East	32.8	4.7	/	37.5	25.0
England - Whole	17.7	8.4	2.6	41.9	29.4

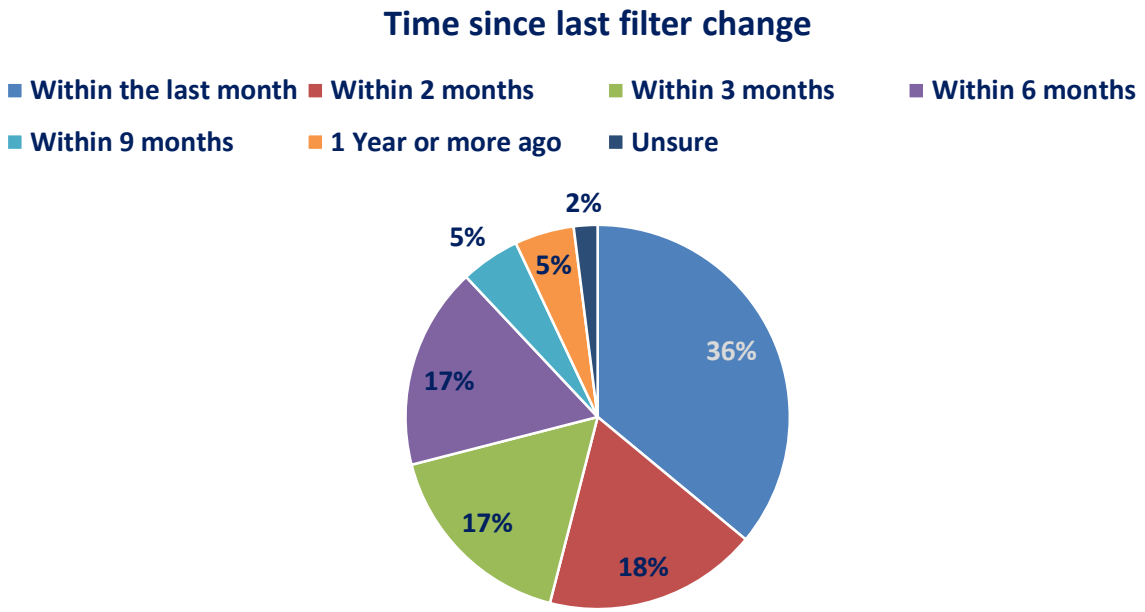
Most responses from Scotland were unsure of the appearance of fuel either in a storage tank or in a machine tank at the time of the breakdown. Of those who had inspected the appearance of the fuel, the vast majority said that fuel appeared cloudier than normal, which may indicate a level of waxing occurring in the fuel.

Across England, the majority of responses indicated that of fuel that had been visually inspected, it appeared normal, with no abnormalities that were visible to the naked eye.

Some responders did not visually check the fuel, accounting for responses of ‘unsure’.

Filters

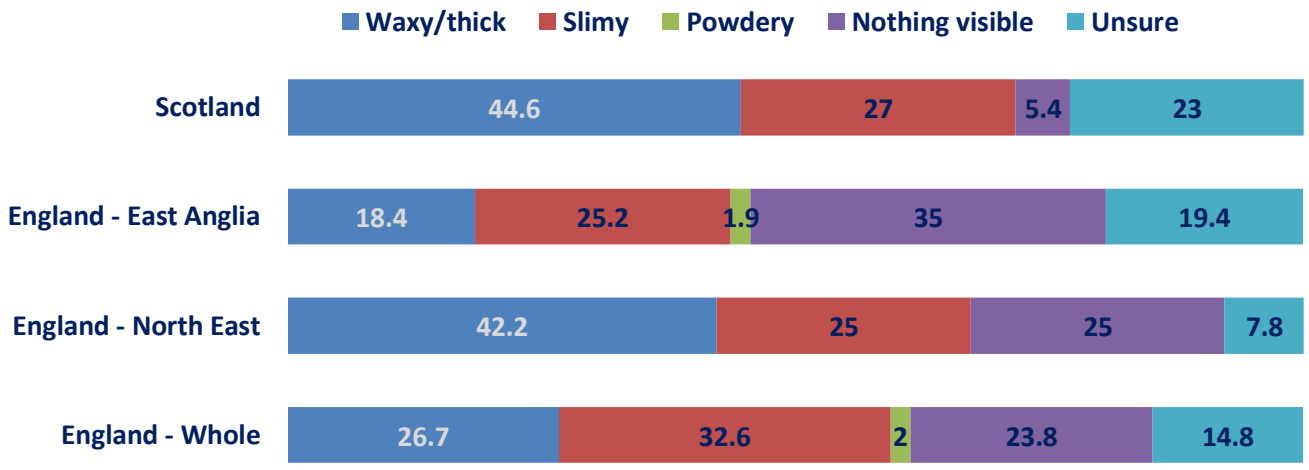
Figure 6



At the time of breakdown, 71% of respondents reported the fuel filter had lasted less than 3 months, with 36% of respondents reporting the filter had lasted less than 1 month. Filter lifetimes largely depend on usage intensity of the vehicle/machine and is usually measured in hours of use. Typically, a fuel filter in a tractor would be expected to last 500+ hours.

Figure 7

Appearance of filter residue at time of breakdown (%)					
	Waxy/thick	Slimy	Powdery	Nothing visible	Unsure
Scotland	44.6	27.0	/	5.4	23.0
England - East Anglia	18.4	25.2	1.9	35.0	19.4
England - North East	42.2	25.0	/	25.0	7.8
England - Whole	26.7	32.6	2.0	23.8	14.8



The vast majority of responses from Scotland (44.6%) reported that the residue on the blocked filter was waxy and/or thick. Some responses (27 %) reported a slimy residue.

Responses from the North East of England were similar, with the majority (42.2 %) reporting a waxy/thick residue and many responses indicating either a slimy residue or nothing visible.

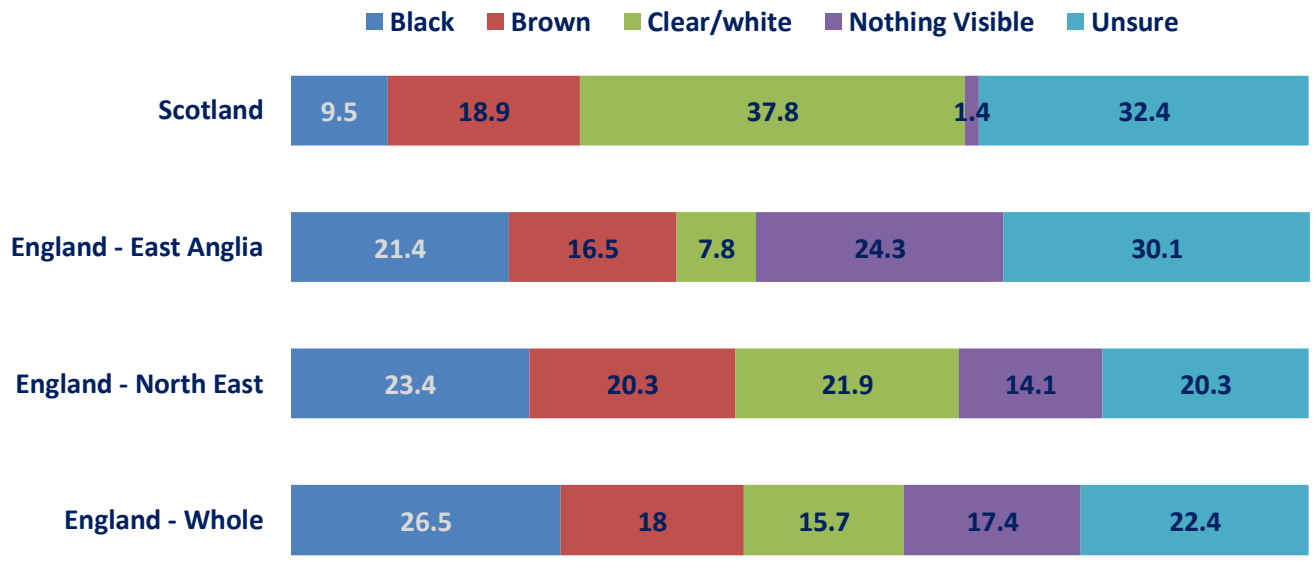
Responses for East Anglia mainly reported that there was no visible residue.

Very few responses indicated a powdery residue.

Some responders did not visually check the blocked filter, accounting for responses of ‘unsure’.

Figure 8

Colour of filter residue at time of breakdown (%)					
	Black	Brown	Clear/white	Nothing visible	Unsure
Scotland	9.5	18.9	37.8	1.4	32.4
England - East Anglia	21.4	16.5	7.8	24.3	30.1
England - North East	23.4	20.3	21.9	14.1	20.3
England - Whole	26.5	18.0	15.7	17.4	22.4



The majority of responses from Scotland indicated that the fuel filter was blocked with a white or clear residue (37.8%).

Across the whole of England, residues were most commonly black, with this trend being followed in the North East region. Again, in East Anglia, a majority of responses (24.3 %) indicated that there was no visible residue. Of those that reported a visible residue, most reported a black residue (21.4%).

Some respondents did not visually check the blocked filter, accounting for responses of ‘unsure’.