Proficiency testing in Animal Feeds Analysis:
A comparison of performance from two independent PT schemes

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Introduction

For the last two years LGC Standards and DUCARES have worked together in the provision of proficiency testing (PT) schemes for the analysis of animal feeds, both companies having accreditation to ISO/IEC 17043.

The Agricultural Laboratories Quality Service (KDLL) scheme operated by DUCARES, on behalf of the Product Board of Animal Feed, is very well established having been in existence since 1988. The AFPS scheme operated by LGC Standards, on the other hand, has been in operation since 2010, covering five testing rounds.

Methods

The data returned by participants from several PT 'rounds' within both the DUCARES' KDLL scheme and the LGC Standards' AFPS scheme, using the same test materials, has been compared.

Both schemes operate using a single sample format; the performance of laboratories is assessed using z-scores. Assigned values are the median of participant results and the SDPA (Standard Deviation for Proficiency Assessment) is the robust standard deviation of the participant results.

The test materials analysed for the purposes of this comparison were broiler feed (minerals and trace elements), cattle feed (proximates) and beef fat (fatty acid methyl esters (FAMES)).

Results

The results returned by the participants of both schemes were generally in good agreement as shown in Figure 1 and Tables 1 and 2.

Figure 1: Median results returned for the determination of 10 individual FAMES in Beef fat, by participants in the DUCARES KDLL and LGC AFPS PT schemes.
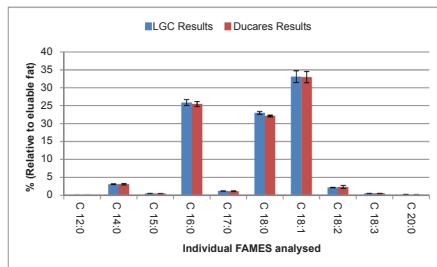
The analysis of proximates in a sample of cattle feed shows a significant difference between the performance of the two groups of participants (Table 3).

The data returned for the AFPS scheme showed a much greater spread. The same effect is seen at the method level, as for fat determination (Table 4).
The comparative effects of the spread of the moisture results can be clearly seen in figure 2.
The median values are similar, however the results for the DUCARES proficiency test are much more normally distributed.

Figure 2: Histogram showing the distribution of results for the determination of moisture returned by participants in the DUCARES KDLL and LGC AFPS PT schemes.

The spread of the data in the results returned for the samples, other than for proximate analysis, provided in the two PT schemes was generally equivalent (Figure 3).

Figure 3: Robust standard deviations for the results returned for the determination of FAMES in Beef fat, by participants in the DUCARES KDLL and LGC AFPS PT schemes.
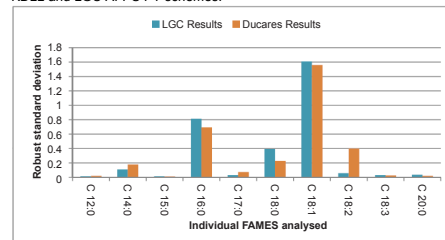
Discussion

The results returned by the DUCARES KDLL and LGC AFPS PT schemes, show no significant differences for all samples.

The spread of data for the analysis of proximates showed significant differences between the DUCARES KDLL and LGC AFPS PT schemes. The data returned in the DUCARES KDLL scheme shows a smaller robust standard deviation.

The participants of the two schemes may have significantly different PT experience; the DUCARES KDLL scheme has been operating for over 20 years.

Figure 4: Percentage of participants returning results for the determination of proximates in cattle feed, by participants in the DUCARES KDLL PT scheme.
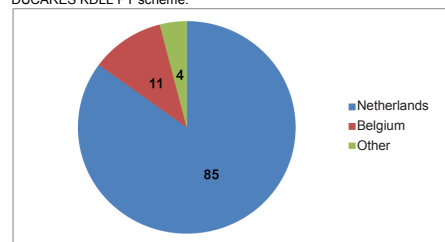
The participants of the DUCARES KDLL scheme are from a small geographical area (Figure 4) and

therefore are will be using methodology which meets the requirements of the reference methods as described by the Product Board of Animal Feed.

Figure 5: Percentage of participants returning results for the determination of proximates in cattle feed, by participants in the LGC AFPS PT scheme.
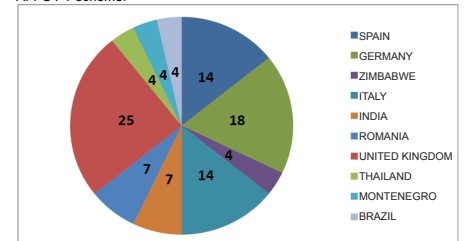
The participants in the AFPS scheme are geographically very widely spread, as shown in figure 5, and are permitted to use any routine methods. In contrast the participants in the AFPS scheme who reported results for the analysis of FAMES were from three European countries only, which may partly explain the smaller spread of data.

Conclusions

1) The results returned by the participants of both the LGC AFPS scheme and the DUCARES KDLL proficiency testing scheme are generally comparable for a range of analytes.

2) The spread of data for proximates analysis was significantly larger for the results returned for the LGC AFPS scheme, than for those returned for the DUCARES scheme.

3) The spread of data may be a result of differences in the participant 'populations', such as experience in PT, participant numbers, geographical location, use of a single method etc.

Future Investigations

1) Collection and comparison of further data to confirm the results observed and to evaluate improvements in performance over time.

2) Collection of method information for proximate-analysis to explain the larger spread of results.

3) Reference methods as described by the Product board of Animal Feed will be used to compare performance of a method or the results of individual participants.

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- Colleagues of DUCARES B.V. and LGC Standard Proficiency Testing

Table 1: Broiler feed results returned for the determination of selected trace elements and minerals, by participants in the DUCARES KDLL and LGC AFPS PT schemes.
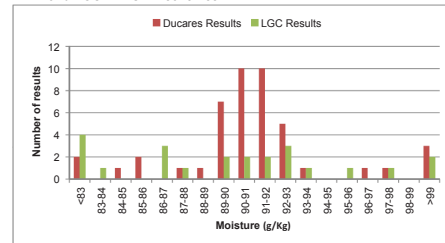
Analyte	Ca	Cl	Cu	Mg	Mn	P
LGC	8.05	2.45	19.88	2.10	123	5.215
DUCARES	7.85	2.66	20.00	2.08	124	5.188
% Difference	-2.5	8.57	0.60	0.95	0.90	-0.52

Table 2: Cattle feed results returned for the determination of selected proximate analytes, by participants in the DUCARES KDLL and LGC AFPS PT schemes.

	Moisture	Crude Protein	Crude Fat *	Crude Ash	Sugars	Crude Fibre	ADF
LGC	90.50	137.40	38.95	70.13	84.80	155.00	222.3
DUCARES	90.77	138.98	41.25	72.46	90.72	152.27	243.9
% Difference	0.30	1.14	5.91	3.3	6.98	-1.76	9.72

*Crude fat results are the median of all methods

Table 3: Spread of data, robust standard deviation for the results returned for the determination of selected proximate analytes, by participants in the DUCARES KDLL and LGC AFPS PT schemes

	Moisture	Crude Protein	Crude Fat*	Crude Ash	Sugars	Crude Fibre	ADF
LGC results	5.19	4.33	6.23	2.69	31.10	13.34	35.21
DUCARES results	1.53	1.51	2.13	1.32	5.81	7.64	27.84
Difference	-3.66	-2.82	-4.1	-1.37	-25.29	-5.7	-7.37

*Crude fat results are the median of all methods

Table 4: Median of data and robust standard deviation for the results returned for the determination of crude fat, by participants in the DUCARES KDLL and LGC AFPS PT schemes.

	DUCARES		LGC	
Method	Median (g/Kg)	RSD	Median (g/Kg)	RSD
Direct Extraction	39.9	1.16	36.5	2.08
Acid Hydroysis/Extraction	42.03	2.42	42.16	4.80