Procedure proposed for quality assurance regarding AC method

Note presented and approved in Cork during the meeting of the Working Group on Performance Recording of Dairy Sheep (29 May 2012)

A procedure of quality assurance is proposed both to control and elaborate an alternative AC coefficient. The main features of the procedure are described below:

The strategy consists in introducing one monthly record at the two milkings per flock-year in order to check the quality of the AT/AC schemes in that flock. This approach should permit to obtain a flock coefficient (average of individual coefficients) either to be directly applied to all test dates or to check the quality of the actual AC coefficients.

In the Sarda breed, two experimental trials were carried out, (i) to show the reliability of the proposed method, (ii) to assess the stability of the coefficient over the test-day.

First trial: reliability of the proposed method

A dataset of 66,542 daily milk yields of 12,609 ewes recorded from November 1997 to August 1998 at 619 test-day in 87 flocks according to the A4 method were available. Furthermore the tank data at the morning and afternoon milkings were available. TMM was calculated, using the Fleischmann method, with the A4 and the AC methods. AC was applied on the morning milking only.
Moreover, TMM was calculated using a modified AC method (AC_M), applying a single fixed coefficient for all test dates calculated as the average of the individual evening/morning milk yield ratios of the flock. Five different coefficients were used according to the months from January (AC_M1) to May (AC_M5).

Table 1 – Descriptive statistics of milk yield during the milking-only period (TMM), difference and Pearson correlations between TMM calculated by A4, traditional AC method and modified AC methods (AC_M1-AC_M5)

	TMM		DIFF		CORR	
Variable	**Mean**	**SD**	**A4**	**AC**	**A4**	**AC**
A4	199	81	0.0	-4.0	1.000	0.992
AC	195	80	4.0	0.0	0.992	1.000
AC_M1	194	83	4.3	0.3	0.982	0.979
AC_M2	193	80	5.6	1.5	0.991	0.993
AC_M3	196	80	3.1	-1.0	0.992	0.995
AC_M4	202	84	-3.5	-7.6	0.989	0.992
AC_M5	204	84	-5.4	-9.4	0.990	0.993

The range of correlations between TMM calculated with A4 and AC_M method is between 0.982 and 0.992. The maximum value, which equals the official AC method, was obtained when the percentage of recorded ewes reached 76.5% (AC_M3). In terms of bias the proposed method was slightly better than official AC method. Indeed, the average

difference between A4 TMM and AC_M3 TMM was 3.1 ± 10.4 L (min -46.4 L; max 55.1 L) whereas the average difference between A4 TMM and AC TMM was 4.0 ± 10.3 L (min -43.6 L; max 76.9 L).
These results show that the proposed modified AC method allows to estimate TMM with a negligible loss of precision respect to the official AC method.

Second trial: stability of the AC coefficient over the milking period

A dataset of 973,688 test-day recorded from 2007 to 2011, representing 201,937 lactations from 113,805 ewes in 440 flocks were considered (Table 2).

Table 2 – Number of lactations (lact), test-day (TD) and mean, standard deviation, maximum, minimum of TD/lactation per year of production (year).

			TD/lactation			
year	**lact**	**TD**	**mean**	**sd**	**maxnc**	**minnc**
2007	42428	199756	4.7	1.1	8.0	3.0
2008	40563	198320	4.9	1.1	8.0	3.0
2009	38765	185741	4.8	1.1	9.0	3.0
2010	39259	191757	4.9	1.1	9.0	3.0
2011	40922	198114	4.8	1.1	8.0	3.0
total	201937	973688	4.8	1.1	9.0	3.0

AC coefficient was calculated for 12,534 flock*test date (table 3) as the ratio between morning and evening milk tank.

Table 3 – Number, mean and standard deviation of AC coefficient per year of production

year	**N**	**mean**	**sd**
2007	2454	1.24	0.19
2008	2539	1.25	0.20
2009	2518	1.25	0.20
2010	2522	1.24	0.21
2011	2501	1.25	0.22
Total	12534		

Average trend of AC coefficient for month of test date between January to June were reported in figure 1 and table 4 (data of other months were excluded for low frequency)

Table 4 – Average value of AC coefficient for month of test date and year of production

Month	**2007**	**2008**	**2009**	**2010**	**2011**	**Total**
Jan	1.30	1.30	1.30	1.28	1.28	1.29
Feb	1.28	1.27	1.27	1.27	1.28	1.27
Mar	1.25	1.25	1.23	1.24	1.26	1.25
Apr	1.22	1.22	1.21	1.22	1.20	1.21
May	1.21	1.21	1.22	1.22	1.22	1.22
Jun	1.22	1.21	1.25	1.26	1.26	1.24
Total	**1.25**	**1.24**	**1.25**	**1.25**	**1.25**	**1.25**

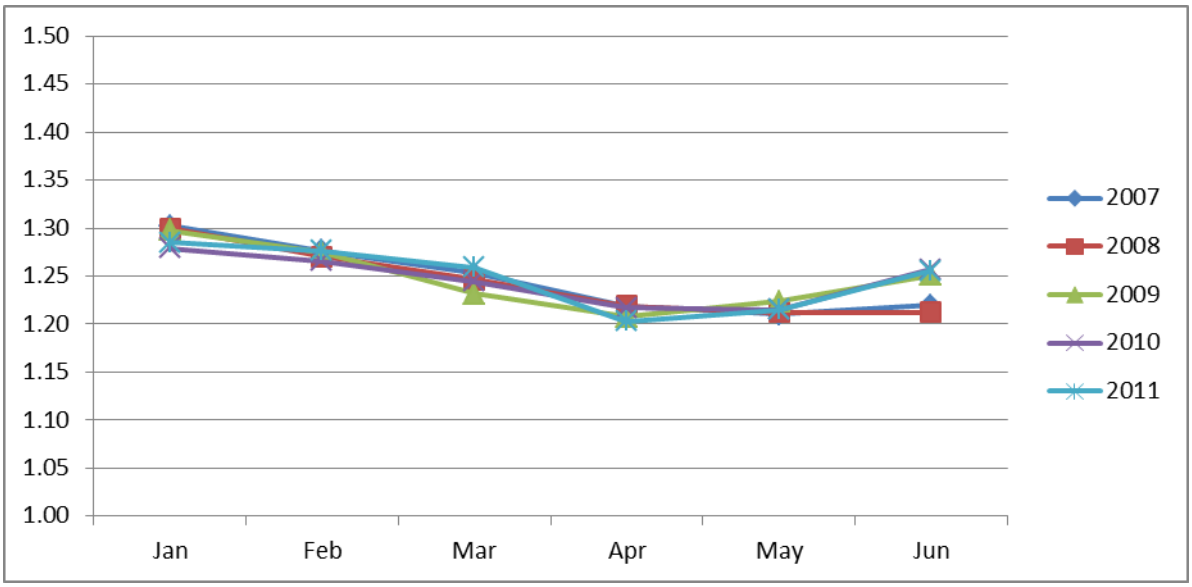

Figure 1 - Average value of AC coefficient for month of test date and year of production

Daily Milk yield was then calculated using the official AC coefficient (MY) or the fixed AC coefficient of March (mMY). Milk yield during the milking-only period was calculated with Fleishmann method using MY (TMM) or mMY (mTMM). Descriptive statistics were reported in Table 5. Correlation between TMM and mTMM was 0.992. The average difference was -0.5 ± 10.3 L (min -108 L; max 90 L)

Table 5 - Descriptive statistics of TMM and mTMM

Variable	N	Mean	Std Dev	Min	Max
TMM	201937	222	78	29	795
mTMM	201937	223	79	30	822

The stability of AC coefficient over the milking period must be checked in the given breed x system, before applying the procedure of quality assurance. Indeed, in some situations, the stability may not be met.

The following figures present the evolution of AC coefficients in 2009 in France for the Lacaune breed (figure 2) and the Pyrenean breeds (figure 3).
These figures show that, whereas the AC coefficient exhibits small variations over the lactation (between 1.89 and 1.92) in the Pyrenean breeds, the variation is more important in the Lacaune breed (between 1.72 and 1.85).
Therefore the procedure of assurance quality must be checked and adapted to each situation.

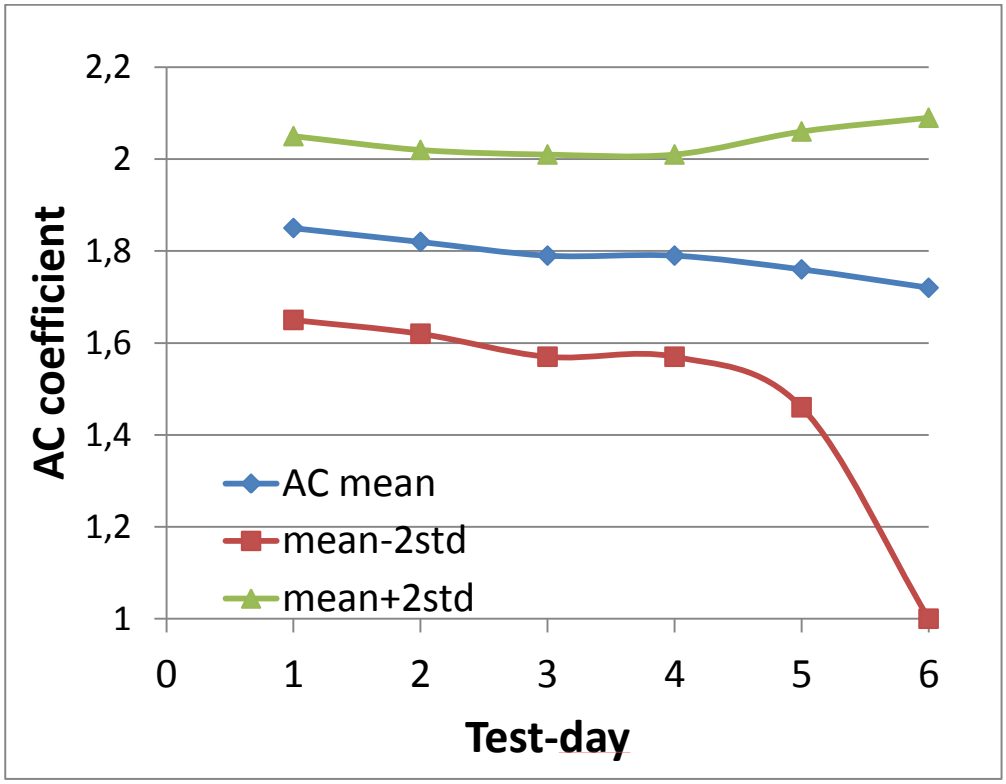

Figure 2 – Evolution of AC coefficient with test-day in the Lacaune breed (data 2009)

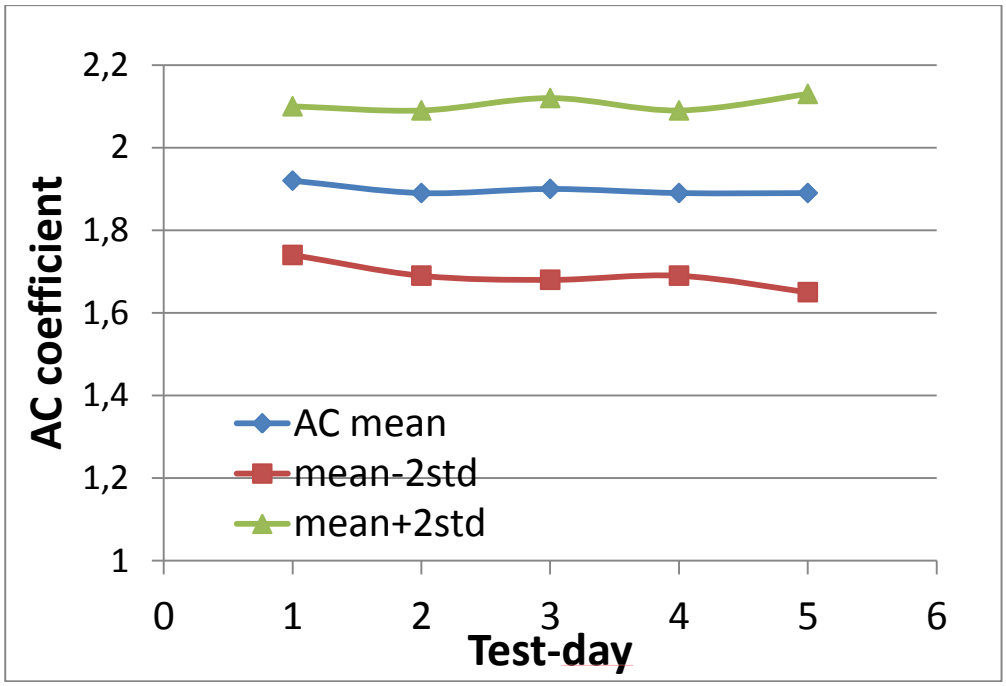

Figure 3 – Evolution of AC coefficient with test-day in the Pyrenean breeds (data 2009)