

RELATIONSHIPS BETWEEN REPRODUCTION PARAMETERS IN DAIRY COWS

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ABSTRACT

The aim of the reproductive management of dairy farms is to keep low the days in milk (DIM). Milk production can be profitable only in that case. Calvings make only low DIM. From the economic point of view, to evaluate the amount of the calving is not simple because in many cases the insemination and the calving are not in the same year. We wanted to find a reproduction parameter, which is easy to record, available real time, and correlate well with other parameters. We collected reproduction data from 21 farms from 2016. Average numbers of cows, number of the ai (artificial insemination) in cows, number of cows pregnancies, open days (OD), service period (SP), time of first ai (TFAI), conception rate of first ai (CRFAI), conception rate of all ai (CRSAI) were collected. The number of the pregnant cows were grouped, pregnancies under 120 days after calving -U120- and pregnancies above 200 -A200- days after calving. The economical effect of open days are well-known. OD correlated with the rate of the pregnancies under 120 days after calving ($r = -0.802$; $P \leq 0.001$). The open days correlated with the rate of the pregnancies above 200 days after calving ($r = 0.889$; $P \leq 0.001$). If the rate of U120 is high, the rate of pregnant cows (ROPC) will be high too ($r = 0.611$; $P = 0.003$). A200 is in negative relation with ROPC ($r = -0.525$; $P = 0.015$). OD correlated with TFAI ($r = 0.562$; $P = 0.008$). ROPC correlated with TFAI ($r = -0.457$; $P = 0.037$). OD correlated with SP ($r = 0.778$; $P \leq 0.001$). SP is in negative correlation with CRFAI and CRSAI ($r = -0.577$, $P = 0.006$; $r = -0.773$, $P \leq 0.001$). SP correlated with U120 and A200 ($r = -0.572$, $P = 0.007$; $r = 0.788$ $P \leq 0.001$). Our study shows that the rate of the pregnant cows are statistically correlated with many important reproduction parameters. The measurement of the number of pregnant cows is easy, available real time and it has important economical effect on milk production. In summary, the number of pregnant cows is a useful parameter to evaluate the reproductive performance and current status of the farms.

Keywords: DIM, number of pregnancies, correlated, reproduction parameters

INTRODUCTION

Many parameters help to evaluate reproduction performance. These parameters are connected to the oestrus cycle and the lactation stadium. The calving interval, open day, conception rate, pregnancy rate, service period, calving rate, number of services, services per conception, non-return rate, productivity, first service conception rate, days to first service (ZÖLDÁG AND HARASZTI, 1994; PLAIZIER ET AL., 1998; KOVÁCS ET AL., 2010; FODOR AND ÓZSVÁRI, 2015) can be used to assess reproduction performance. KRAJNEC ET AL. (2015) evaluate many reproduction parameters.

Milk production can only be profitable with low days in milk (DIM). The aim of the reproductive management is to keep low DIM of dairy farms (RIBERIO ET AL., 2012). In fact, calvings make only low DIM. From the economic point of view, to evaluate the amount of calving is not simple because in many cases the insemination and the calving are not happening in the same year. Previously, open day and calving interval were used to evaluate reproduction from the economical point of view (ÓZSVÁRI AND KERÉNYI, 2004).

MATERIAL AND METHOD

We collected reproduction data from 21 farms from 2016. All of the farms are located in Hungary. They have different sizes with different milk production levels. They use different reproduction technologies. All of these farms use RISK A farm system. Average numbers of cows, number of the ai (artificial insemination) in cows, number of cows pregnancies, open days (OD), time of first ai (TFAI), conception rate of first ai (CRFAI), conception rate of all ai (CRSAI) were collected for the study purposes. From these data, service period was calculated by our study group (open day – time of first ai = service period). The average number of cows was calculated by RISK A software. The numbers of the pregnant cows were grouped according to the followings: pregnancies under 120 days after calving -U120- and pregnancies above 200 -A200- days after calving. Pregnancies were correlated to the average number of cows (*Table 1*). Correlation between reproduction parameters were evaluated by SPSS statistical software package.

RESULTS

In the daily routine, there are some possibilities to create good reproduction parameters in the dairy farms. If only the heating cows are selected (for condition, heating intensity) some parameters predict a well functioning, while the number of pregnant cattles are still low. In our data, there is a farm (farm 18) with relatively decreased OD (124 days) but on the other hand, the farm had low rate of pregnant cattles (for example: 62.9%). The same phenomena could happen with the CRSAI and CRFAI values (see farm1) (*Table 1*).

Table 1. Basic data

	ROPC	OD	TFAI	SP	CRFAI	CRSAI	U120	A200
farm1	66.6	157	97	60	32.7	33.2	42.0	23.7
farm2	79.4	124	66	58	31.6	30.6	64.3	13.1
farm3	78.6	129	71	58	30.8	30.5	59.7	13.8
farm4	74.8	129	71	58	30.3	31.8	57.9	15.6
farm5	75.9	141	68	73	30.1	30.5	52.9	20.1
farm6	72.8	121	67	54	29.2	28.4	62.3	12.5
farm7	70.7	128	74	54	28.1	31.1	51.9	15.9
farm8	64.6	157	89	68	27.9	28.6	44.3	22.7
farm9	58.1	129	71	58	26.4	30.3	54.3	17.2
farm10	71.9	151	79	72	22.8	23.0	49.4	19.5
farm11	62.5	186	85	101	22.4	21.4	41.1	33.7
farm12	72.2	153	66	87	21.3	23.9	48.9	23.6
farm13	84	116	50	66	21.2	26.5	63.1	12.4
farm14	72.9	163	61	102	21.0	20.3	48.1	26.7
farm15	73.6	159	73	86	20.6	25.3	42.8	27.9
farm16	69.8	156	62	94	20.8	19.6	50.9	23.9
farm17	72.6	126	58	68	18.6	22.7	59.2	14.9
farm18	62.9	124	59	65	18.0	22.8	51.4	21.0
farm19	60.8	152	73	79	17.7	21.3	36.8	30.6
farm20	72.9	147	65	82	15.6	20.0	41.8	28.2
farm21	72.4	129	53	76	13.8	20.7	51.2	17.6

Open days and conception rate are not able to evaluate the reproduction performance well. The economical effect of open days are well-known. The change of open days with any number of days has significant economical effect. OD correlated with the rate of the pregnancies under 120 days after calving ($r = -0.802$; $P \leq 0.001$) (Table 2).

Table 2. Correlation between OD and U120 and A200

		OD	U120	A200
OD	Correlation	1	-.802**	.889**
	Sig. (2-tailed)		.000	.000
	N	21	21	21
U120	Correlation	-.802**	1	-.920**
	Sig. (2-tailed)	.000		.000
	N	21	21	21
A200	Correlation	.889**	-.920**	1
	Sig. (2-tailed)	.000	.000	
	N	21	21	21

** Correlation is significant at the 0.01 level (2-tailed).

The open days correlated with the rate of the pregnancies above 200 days after calving ($r = 0.889$; $P \leq 0.001$).

If the rate of U120 is elevated, the rate of pregnant cows (ROPC) will be increased too ($r = 0.611$; $P = 0.003$) (Table 3).

Table 3. Correlation between U120 and ROPC and A200

		U120	A200	ROPC
U120	Correlation	1	-.920**	.611**
	Sig. (2-tailed)		.000	.003
	N	21	21	21
A200	Correlation	-.920**	1	-.525*
	Sig. (2-tailed)	.000		.015
	N	21	21	21
ROPC	Correlation	.611**	-.525*	1
	Sig. (2-tailed)	.003	.015	
	N	21	21	21

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

A200 is in negative relation with ROPC ($r = -0.525$; $P = 0.015$). If there are many pregnant cows in the farm, the number of pregnant cows above 200 days from calving is decreased. OD correlated with TFAI ($r = 0.562$; $P = 0.008$) (Table 4).

Table 4. Correlation between OP and TFAI

		OD	TFAI
OD	Correlation	1	.562**
	Sig. (2-tailed)		.008
	N	21	21
TFAI	Correlation	.562**	1
	Sig. (2-tailed)	.008	
	N	21	21

** Correlation is significant at the 0.01 level (2-tailed).

To achieve low OD, the AI should be as close as possible to the calving period. ROPC correlated with TFAI ($r = -0.457$; $P = 0.037$) (Table 5).

Table 5 Correlation between TFAI and ROPC

		TFAI	ROPC
TFAI	Correlation	1	-.457*
	Sig. (2-tailed)		.037
	N	21	21
ROPC	Correlation	-.457*	1
	Sig. (2-tailed)	.037	
	N	21	21

* Correlation is significant at the 0.05 level (2-tailed).

To achieve a higher number of pregnant cows, the first AI should be started as soon as possible. OD correlated with SP ($r = 0.778$; $P \leq 0.001$) (Table 6).

Table 6. Correlation between SP and OD

		SP	OD
SP	Correlation	1	.778**
	Sig. (2-tailed)		.000
	N	21	21
OD	Correlation	.778**	1
	Sig. (2-tailed)	.000	
	N	21	21

** Correlation is significant at the 0.01 level (2-tailed).

The low SP means that, the cattle become pregnant in a very short period of time. SP is in negative correlation with CRFAI and CRS AI ($r = -0.577$, $P = 0.006$; $r = -0.773$, $P \leq 0.001$) (Table 7).

Table 7. Correlation between SP and CRFAI and CRSAI

		SP	CRFAI	CRSAI
SP	Correlation	1	-.577**	-.773**
	Sig. (2-tailed)		.006	.000
	N	21	21	21
CRFAI	Correlation	-.577**	1	.903**
	Sig. (2-tailed)	.006		.000
	N	21	21	21
CRSAI	Correlation	-.773**	.903**	1
	Sig. (2-tailed)	.000	.000	
	N	21	21	21

** Correlation is significant at the 0.01 level (2-tailed).

The SP can only be short if the conception rate is favourable. SP correlated with U120 and A200 ($r = -0.572$, $P = 0.007$; $r = 0.788$, $P \leq 0.001$) (Table 8).

Table 8. Correlation SP and U120 and A200

		SP	U120	A200
SP	Correlation	1	-.572**	.788**
	Sig. (2-tailed)		.007	.000
	N	21	21	21
U120	Correlation	-.572**	1	-.920**
	Sig. (2-tailed)	.007		.000
	N	21	21	21
A200	Correlation	.788**	-.920**	1
	Sig. (2-tailed)	.000	.000	
	N	21	21	21

** Correlation is significant at the 0.01 level (2-tailed).

There are many pregnant cows under 120 days from calving when the SP is low.

CONCLUSIONS

Our study shows that the rate of the pregnant cows are statistically correlated with many important reproduction parameters. The measurement of the number of pregnant cows is simple, available real time and it has important economical effect on milk production (correlation open days). In summary, the number of pregnant cows is a potentially useful parameter to evaluate the reproductive performance and current status of the farms.

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