The relationship between seminal abnormalities and seminal motility parameters

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When seminal quality is evaluated, the only parameters tested are motility (subjective evaluation) or an objective evaluation, based on the use of computer-assisted motility analysis methods, together with the evaluation of seminal abnormalities.

The combination of the two parameters will be used to validate or reject an ejaculate. However, there are primary anomalies that cannot be observed in a subjective or objective evaluation by using only a motility test. These abnormalities could suffer seasonal variations throughout the year.

Materials and methods

The aim of the study is to discover a pattern of the evolution of these abnormalities which are hidden in a routine analysis; and also compare the semen quality parameters (anomalies) with the motility values obtained with computer assisted semen analysis (CASA) system for seminal analysis.

The study includes boars from two insemination centres with similar location and conditions.

When the ejaculates arrive at our laboratory at 32°C (prediluted 1:1), a phases-contrast microscope equipped with CASA system is used for analysing the processed ejaculates. CASA system evaluates exclusively the seminal concentration of each sample and the progressive and total motility.

At the same time, a subjective evaluation is done and if the sample has a viability of 80% or more, an Eosin-Nigrosin stain is prepared in order to obtain the exact percentage of acceptable spermatozoid. This evaluation is corroborated with the record of the seminal quality of the boar. The good semen quality ejaculates (with more than 80% viability) and the bad ones (dismissed) are not included in the study.

The selected ejaculates are those with an initial subjective evaluation of viability between ≤70% and ≥80%.

The morphoanomalies of 3,773 ejaculates are analysed during 21 months, and also the type of movement from all the ejaculates, specifically referring to the following parameters:

- DAP (distance average path).
- DCL (distance curvilinear).
- DSL (distance straight line).
- VAP (velocity average path).
- VCL (velocity curvilinear).
- VSL (velocity straight line).
- STR (straightness – VSL/VAP).
- LIN (linearity – VSL/VCL).
- WOB (wobble – VAP/VCL).
- ALH (amplitude of lateral head displacement).
- BCF (beat cross frequency).
- GCP (proximal cytoplasmic droplets).
- GCD (distal cytoplasmic droplets).
- CU (tail anomalies).
- M (dead sperm).

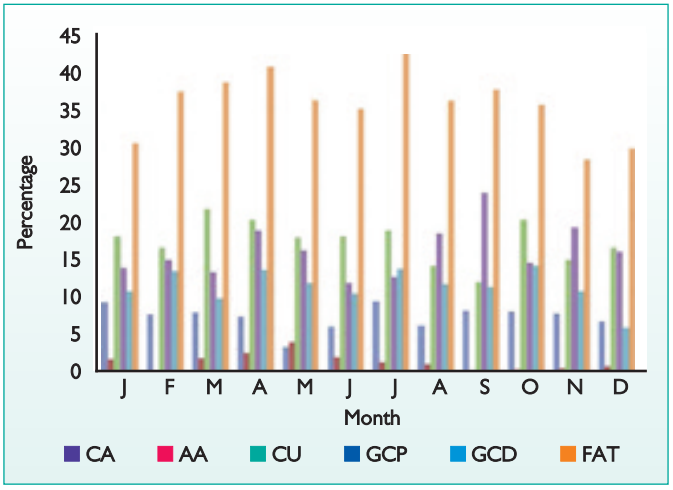

Fig. 1. Percentage of anomalies distributed throughout the year.

Results

First of all, observing how the percentage of anomalies are distributed throughout the year, based on VLA (the limit value analysed of each anomaly), it can be stated that there is not a standard distribution.

The FAT anomalies (total abnormal forms) reach the minimum values in winter (from November to January), whereas the maximum values are reached in April (spring) and July (mid summer).

Referring to the 'hidden' anom-

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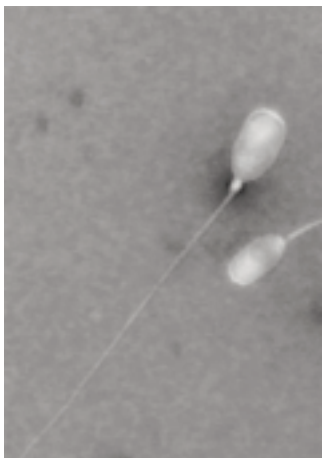
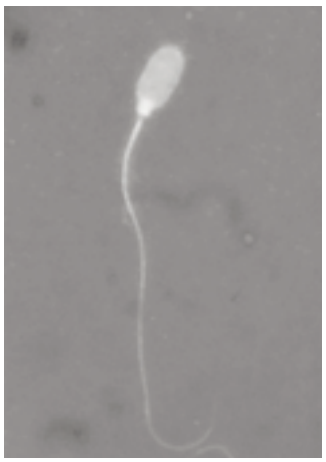
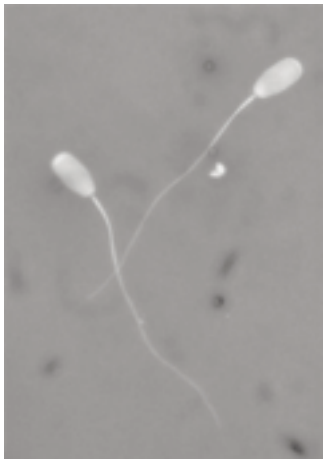
Head anomalies: maximum values are reached in January (lower FAT) and in July (higher FAT); and the minimum values appear in May and June (higher FAT too).





Acrosome anomalies: maximum values are obtained in April and May; and the minimum values in February and September.



	Avg.	Mobile (%)	Progressive (%)	Concen-tration	DAP	DCL	DSL	VAP	VCL	VSL	STR	LIN	WOB	ALH	BCF
50 worst GCD	59.22	92.702	79.351	0.261	28.946	50.798	19.195	64.142	112.366	42.667	0.669	0.386	0.570	2.995	33.132
50 worst GCP	63.50	91.427	78.116	0.161	29.336	49.310	21.451	63.876	107.154	46.830	0.727	0.439	0.595	2.597	35.632
50 worst CU	49.78	91.699	78.595	0.232	30.442	49.044	22.637	66.937	107.596	49.936	0.739	0.465	0.622	2.638	35.840
50 worst CA	24.64	90.024	78.029	0.160	30.130	48.772	23.228	65.705	106.173	50.752	0.764	0.481	0.617	2.473	36.504
50 worst M	27.56	91.289	80.071	0.174	32.095	51.292	24.583	70.370	112.349	53.990	0.766	0.489	0.630	2.638	37.255
50 worst AA	17.30	91.504	80.978	0.172	32.758	52.416	24.891	71.730	114.652	54.613	0.758	0.483	0.628	2.607	37.298
50 best normal	192.34	93.824	85.847	0.157	34.274	52.379	26.983	74.967	114.488	59.112	0.785	0.525	0.660	2.577	38.320

Table 1. Comparison of the 50 worst values and the 50 best ejaculates.

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alies, specifically CA (head anomalies) and AA (acrosome anomalies), it can be observed:

- CA: maximum values are reached in January (lower FAT) and in July (higher FAT); and the minimum values appear in May and June (higher FAT).
- AA: maximum values are obtained in April and May; and the minimum values, in February and September

In order to analyse the anomalies by taking into account the average movement of the ejaculates, the 50 worst values are compared with the 50 best ejaculates (see Table 1).

- Among the different values of velocity, (VSL, VCL and VAP), the best results are the ones from ejaculates with a higher percentage of normal spermatozoids.
- Among the different values of distance (DSL, DCL and DAP), the best results are the ones from ejaculates with a higher percentage of normal spermatozoids.
- Among the different values of distance (DSL, DCL and DAP), the worst results are the ones from ejaculates with propulsion problems: tail anomalies (CU) and distal drops anomalies (GCD), as well as problems with flagellum beating frequency (BCF).
- A high percentage of CA anomalies affects directly to the values of velocity and curvilinear-linear distance, as well as the ALH parameter.
- A high STR indicates good seminal quality, whereas if the value is low, it indicates a high percentage of GCD.
- AA anomalies are unperceived referring to the values of route and velocity.

Conclusions

The percentage of anomalies does not follow a standard distribution through the year and the CA and AA anomalies do not have a parallel evolution with the percentage of total FAT. There are specific parameters of spermatic velocity and route – and parameters mixing both elements – that can demonstrate the presence of unperceived anomalies in a routine test. This may be a new line of study for the improvement of CASA systems in the future.

It is very important to make a complementary test of evaluation of seminal quality, apart from the routine motility evaluation with CASA systems. ■

References are available from the author on request