



Abaxis, Inc.  
3240 Whipple Road  
Union City, CA 94587  
Tel. 800.822.2947  
Fax 510.441.6151

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**Welcome!**

...to the October 2004 issue of VetCom. In this issue we will be discussing quality control for the in-clinic laboratory. We hope this overview will be helpful to those who have or are interested in internal laboratory capability but have limited experience with laboratory systems.



Also included in this issue is a summary article by Dr. Brent Hoff, et al, from the Animal Health Laboratory at the Ontario Veterinary School (University of Guelph, Ontario, Canada) of his performance evaluation of the (in-clinic) VetScan HMII hematology system and the (reference laboratory) Bayer Advia 120 hematology system. This may be of particular interest to those evaluating the CBC analyzer options currently available to the practicing veterinarian.

Best wishes for a lovely autumn and Happy Halloween.  
...Until December!

**CONFERENCE CALENDAR**

Oct 1-3  
**Washington State VMA**  
Yakima, WA

Oct 6-10  
**Wild West Veterinary Conference**  
Reno, NV

Oct 7-10  
**Wisconsin VMA**  
Madison, WI

Oct 12-14  
**Atlantic Coast Veterinary Conference**  
Atlantic City, NJ

**GUERRILLA MARKETING'S GOLDEN RULE #33:**

**Keep Your Sense of Humor...In Check**

“Avoid the use of humor unless it is pertinent to your offering and does not detract from it.”

Too many marketing creators believe that marketing is supposed to be funny, to make people laugh. People being people however, will remember the humor of your marketing not the idea you want them to remember. And there's very little chance they'll remember your product or service

Another aspect to consider is that repetition is necessary to assure the effectiveness of marketing, but humor loses its punch with repetition. It

gets in the way with repetition, and repetition is the way to gain “share of mind.”

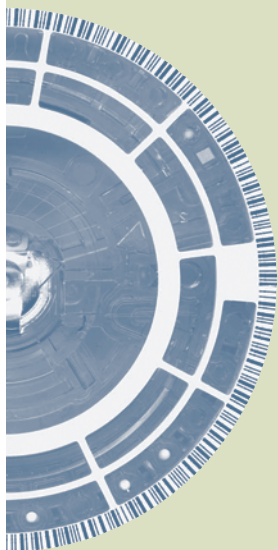
Marketing people who are unable to find something interesting to say about their prospects, unable to spot a major benefit of their offering, unable to come up with the primary reasons people should use their service and unable to create demand-these are the one who resort to humor.

Let your personal experience understand the limitations of using humor in marketing. Does a humorous advertisement make you

want to make a purchase; do you even remember what the product is or who offers it? How long can you listen to the advertisement before it begins to grate on you?

You don't want to tell people how funny your marketing is, you want to tell them how they can benefit from what you have to offer.

Focus your marketing on what's in it for your prospect, and concentrate on what it is that makes your clinic better, more convenient and a more pleasant experience than that of your competition.



*“One of the most crucial aspects of an accurate result is a high quality sample.”*



**IN THE TRENCHES**

# Quality Control in In-Clinic Lab Testing

As the benefits of in-clinic testing, from prompt and effective medical care to client convenience, become more desirable, it is more important for veterinarians to have a clear understanding of the components integral to quality test results.

There are three primary aspects of diagnostic testing quality: Quality of the Sample; Quality of the Analysis; and Quality of Record-Keeping

**1. QUALITY OF SAMPLE**

One of the most crucial aspects of an accurate result is a high quality sample. Proper blood collection and handling is easily controlled in the clinic, but its significance is often not clearly understood, resulting in a less than optimal result. Deleterious effects of improper sample collection and handling is generally more pronounced in the veterinary clinic compared with the human clinical laboratory as a result of challenging phlebotomy and the unique characteristics of veterinary blood. To follow is a list of the more common sample quality problems, the issues they cause and tips to avoid them:

**Over/Under-dilution with anticoagulant:** It is important to introduce the correct quantity of blood, appropriate to the collection tube, to avoid dilution errors when anticoagulants are used.

Rinsing a syringe with anti-coagulant prior to collection can be problematic for the same reason and is therefore not recommended. Be sure to fill your collection tube at least halfway with blood to avoid dilution error, and of course mix well, by inversion, immediately thereafter.

**Hemolysis:** Hemolysis, or lysing of red blood cells, occurs most frequently during sample collection. Hemolytic

samples may affect results in the following manner:

Hematology Effects

- Falsely decreased RBC count and PCV (hematocrit)
- Falsely elevated MCHC (due to normal hemoglobin results with falsely decreased PCV)

Chemistry Effects

*Biochemical changes resulting from lysed RBCs*

- Elevated AST
- Elevated LDH

*Photometric Interference resulting from released hemoglobin (red color-method dependent)*

- Elevated Glucose
- Elevated Cholesterol
- Elevated total protein
- Elevated Lipase
- Decreased Calcium
- Decreased bilirubin
- Decreased ALP

Collection-induced hemolysis may be minimized by using the smallest gauge (largest bore) needle practicable. It is also useful to remove the needle from the syringe when transferring the blood sample into the collection tube to avoid forcing the sample back through, which can result in hemolysis.

**Lipemia:** Gross lipemia (turbid sample) is most commonly due to the presence of excess triglycerides in the form of chylomicrons (exogenous lipemia, resulting from fatty dietary intake). On chilling of these samples (refrigeration) the chylomicrons rise to the top to form a layer of fat, with clear serum/plasma below. Endogenous lipemia on the other hand results from excessive very low density lipoproteins (VLDLs), which will remain uniform in a sample even after refrigeration.

Lipemia may effect test results in the following manner (the degree of effect is directly proportional to the degree of lipemia present):

Hematology Effects

- Falsely Elevated Hemoglobin
- Falsely elevated MCHC

Chemistry Effects

*Biochemical changes resulting from turbidity.*

(Na & K are present in aqueous plasma/serum only-significantly increased non-aqueous lipids in a sample serve to “dilute” their levels)

- Falsely decreased sodium
- Falsely decreased potassium

*Photometric Interference resulting from sample turbidity*

- Falsely Elevated Total protein
- Falsely Elevated Albumin
- Falsely Elevated Glucose
- Falsely Elevated bilirubin
- Falsely elevated Calcium
- Falsely Elevated Inorganic Phosphate

NOTE: The presence of lipemia also increases the tendency for hemolysis during sample handling.

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## NOTEWORTHY EVENTS

Sunday, October 10, 2004  
Penn Vet Conference Center  
53 Industrial Circle  
Lancaster, PA 17601

**Best Practices in Avian Medicine  
Don Harris, DVM**

For information and registration contact: Diane Evansosky  
1-800-233-0210

**PERFORMANCE REPORT**

# VetScan HMII vs. Bayer Advia 120

*A comparison of two blood counting systems for analysis of blood of common domestic animals, by Michael Geist and Brent Hoff*

**Location:** Clinical Pathology, Animal Health Laboratory, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada

**Completed:** October 2004



Many reference veterinary laboratories in North America use a large hematology system such as the Bayer Advia 120 as their primary hematology system. With many smaller clinic hematology systems available, our interest was to determine how a newer small hematology analyzer, the VetScan HMII (Abaxis), would compare to the larger system for the analysis of canine, feline, and equine blood samples. The HMII uses impedance methodology, and the Advia utilizes laser-assisted flow cytometry with two different methods (measuring absorption and scatter). A peroxidase staining method, as well as a Basophil channel that measures nuclear density against cell size. These two instruments may often be used in conjunction with one another for hematology analysis by veterinarians who routinely use a smaller clinic system in-house as well as the reference laboratory for more complicated cases and as quality assurance for the clinic laboratory. The objective of this study was to compare the results of the standard hemogram on the clinic system with the reference instrument.

One hundred and thirty four canine, 47 feline and 91 equine samples that had been previously run on the Advia 120 were run twice on the VetScan HMII in the Clinical Pathology Laboratory at the Animal Health Laboratory. Samples were submitted in EDTA blood vials, received from the Ontario Veterinary College

Veterinary Teaching Hospital and external clinics and analyzed within two hours of each other.

The parameters compared in this study were white blood cells (WBC), granulocytes (neutrophils, eosinophils, basophils), red blood cells (RBC), hemoglobin (Hgb), hematocrit (Hct), mean corpuscular volume (MCV), and platelets (Plts). The HMII and the Advia hematology analyzers showed excellent agreement for the 7 parameters that were compared. Both systems met with almost perfect agreement. The exception was equine platelet counts that showed moderate agreement. The feline platelets counts

showed substantial agreement. This reduced correlation can be attributed to platelet clumping as confirmed on the blood smear (platelet data on file). Pearson correlations were calculated to compare paired sample values in each species and reported in Table 1.

The HMII and the Advia employ notably different methodologies. This may have some effect on the measured level of agreement of the various parameters. The carryover, within run precision, run-to-run precision, and linearity of the HMII was acceptable for all species and parameters. With the exception of the one parameter, the HMII was a reliable analyzer when compared with the Advia and would be an asset as an in-house system in a veterinary practice.

**Table 1: Pearson correlations for canine, feline and equine blood samples**

ANALYTE	PEARSON CORRELATION (R)		
	Canine	Feline	Equine
WBC	0.99	0.91	0.98
Granulocytes	0.96	0.94	0.92
RBC	0.95	0.99	0.96
Hgb	0.98	0.97	0.97
HCT	0.97	0.95	0.95
MCV	0.80	0.87	0.94

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CONTACTS**  
1-800-822-2947

**VetCom Issues**

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rotor credits, software queries

**Customer Service**

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Valerie Campbell, Manager  
direct orders, local represen-  
tative and VetScan distributor  
information

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Central Area Sales Director  
Randy Knick, ext. 1509

Western Area Sales Director  
Jon Stern, ext. 1462

QUALITY CONTROL, CONTINUED FROM PAGE 2

The best way to avoid lipemia, in most cases, is to collect samples following a 12-hour+ fast (e.g. overnight). When circumstances do not allow however, the chilling method (refrigeration) will separate the fatty layer, if chylomicrons are involved. A lipid-clearing product, "Lipoclear" (Statspin Inc, Norwood, MA), is also available on the market, but should be validated to confirm efficacy prior to accepting results.

**Icterus:** Icterus is the result of excessive bilirubin in the bloodstream. Bilirubin interference arises from its spectral properties and its ability to react chemically with other reagents resulting in decreased analyte values in oxidase/peroxidase test methods

such as those used to determine values of: glucose, cholesterol, creatinine and others. Bilirubin also (competitively) interferes with albumin dye-binding methods.

**Stress-Effects: Fractious Patients**

The effects of adrenaline are more pronounced in the cat than the dog and may effect a number of test parameters. These effects, although temporary, will remain pronounced when blood is collected under general anesthesia if there was a struggle during induction.

Hematology

- Increased RBC count
- Increased Hemoglobin
- Increased PCV (hematocrit)

*contraction of the spleen, introduces more RBCs into circulation*

- Increased lymphocytes
- Increased neutrophils
- Increased platelets

Chemistry

- Elevated Glucose
- Decreased total carbon dioxide (bicarbonate) arising from hyper-ventilation

**Medications**

- Many drugs will cause biological effects that interfere with various tests. Refer to texts such as Blackwell Press: *Veterinary Drug Handbook* (Plumb) and *Fundamentals of Veterinary Clinical Pathology*

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## VetScan News & Special Offers

■ **DIAGNOSTIC PLUS PROFILE**

Since the introduction of the VetScan Comprehensive Diagnostic Profile (Alb, ALP, ALT, Amy, BUN, Ca, Cre, Glob, Glu, K, Na, Phos, TBil, TP) Abaxis has predictably, seen a very significant decline in utilization its predecessor, the Diagnostic Plus Profile. For this reason, we plan to discontinue manufacture of the Diagnostic Plus Profile as of December 31, 2004. We are confident that the Comprehensive Diagnostic Profile will serve your general diagnostic needs and our T4-Cholesterol rotor will prove an ideal screening tool for canine hypothyroidism. Although we are planning to discontinue manufacture in December, you will be able to order the Diagnostic Plus into 2005 from distributor inventory.

■ **WITNESS HW: \$3.00/TEST FOR QUALIFIED VETSCAN CUSTOMERS**

All qualified\* VetScan customers are eligible for a Witness<sup>™</sup> HW Canine Heartworm Test preferred customer cash rebate on all Witness<sup>™</sup> HW Tests (purchased in 25-test size packages) for a 12-month period following program enrollment To enroll in the VetScan HW Rebate Program send your request by Nov 15, 2004 to: Abaxis VetScan/Witness HW Rebate Program, 3240 Whipple Rd., Union City, CA 94587 FAX: 510-441-6150

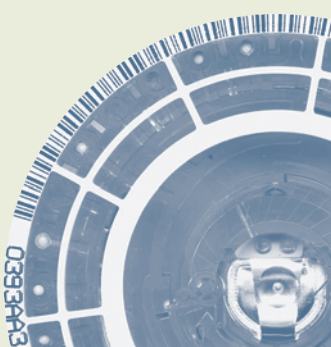
*\*VetScan customers (current, or newly purchased VetScan users) qualify with all new purchases of Witness heartworm tests made for up to 12-months following program enrollment, Qualified customers will be rebated for the difference between price paid and \$3.00 per test (e.g. if purchase price is \$3.50, customer will be rebated at a rate of 0.50 per test), with a maximum rebate of 0.75 per test. There is no minimum or maximum heartworm test purchase requirement to qualify. All rebates will be provided by check. Allow 4-6 weeks for processing. All qualified rebate requests will be honored through November 15, 2005. Requests will not be honored beyond that date.*

■ **TAKE A FREE TEST DRIVE**

As a result of the popularity of the VetScan Test Drive Program, we have extended our offer. Test Drive the VetScan for 48 hours right in your clinic.

We'll provide the training and the rotors—with no obligation\*. Prove to yourself how simple accuracy can be! For further information, or to schedule a Test Drive contact your local Abaxis representative or [abaxis@abaxis.com](mailto:abaxis@abaxis.com)

*\*non-VetScan customers only*



## 2. QUALITY OF THE ANALYSIS

**Accuracy:** Accuracy is the degree to which results are “correct.” This is typically established by comparing results to that of an established reference method. Given a comprehensive population of samples (results ranging from the abnormally low through abnormally high), one would expect a significant level of agreement (correlation) with the reference. All manufacturers should have such data on file and available for review.

**Precision:** Precision is a reflection of the repeatability of sample results. Typically a single sample will be run multiple times, on multiple instruments and over multiple days to establish acceptable precision. All manufacturers should have such data on file and available for review.

**Clinical Performance:** It is valuable to evaluate how well a system performs (accuracy, precision, user-friendliness, etc) in the clinical setting. This information may be available as pre-release clinical trial data, published articles or user evaluations. Check with the manufacturer regarding sources to review the clinical performance of their systems. The Veterinary Information Network (VIN.com) also provides a rich resource for published articles, conference abstracts and user opinion that may be useful when researching systems.

**In-clinic validation:** Regardless of the available data from the manufacturer, or other sources, it is always in your best interest (and in line with best laboratory practices) to “validate” the system prior to purchase. Most manufacturers will encourage this process and commonly absorb the associated costs. A simple system

validation would include a number of comparative tests (accuracy) whereby samples run on the in-clinic system would also be sent into a reference laboratory for comparison. It is best to compare both well and ill patient samples for this purpose.

Review the results with the manufacturer and discuss/get explanation for any of those that do not compare well. It is also a good idea to verify precision, which can be accomplished by simply running repeat analysis of the same samples and comparing the values.

### Species-specific performance:

When evaluating a system, it is useful to understand which species have been tested and validated relative to those you treat on a regular basis.

- Which species have established references ranges?
- Are the system/test dynamic ranges sufficient for the species you treat?
- Will the system provide needed results from small samples? (sick animals, exotic mammals, birds, reptiles)

### Ongoing Quality Control

**Sample-specific:** As discussed previously, sample quality plays a vital role in results quality. Does the system in question provide sample quality evaluation to advise you when and if issues of sample quality will effect test results deleteriously, or is there risk of the system reporting (and the clinician acting on) invalid results due to sample issues?

Integrated sample quality assessment can be tremendously helpful when interpreting results run on less than optimal samples.

**Assay-specific:** It is important to understand the need to have a routine quality assessment method to verify performance of the test. These quality control assessments typically include verification of expected reaction and completion of each test. Quality control may be accomplished automatically, externally or both. External quality control assessment may be accomplished using prepared QC materials, or frozen aliquots of a sample of known value. Inquire with the manufacturer regarding recommendations for both integrated quality control and/or external QC processes.

**System-specific:** In addition to establishing the quality of the test itself (reagents), it is important to verify that the system hardware is functioning properly. These quality checks typically include assessment of the motor functions, light sources and other mechanical aspects of the system. Inquire with the manufacturer regarding their quality control checks and recommendations for their particular system/s.

## 3. QUALITY OF RECORD KEEPING

The final step in assuring quality is accurate record keeping. This includes procedures for proper identification of samples, results and records. Clearly, regardless of sample and test quality, results are meaningless (and perhaps even harmful) if they are assigned to the wrong patient. Prompt identification and attention to detail are the key aspects of record keeping quality.

Additionally, the advancements of practice management software with laboratory system integration offers automated methods for record-keeping thereby streamlining the effort and reducing possible errors.



### VetScan Distributors

#### U.S.

AVSC-American Veterinary Supply . . . . .800-869-2510

DVM Resources . . . . .877-828-1026

Henry Schein . . . . .800-872-4346

IVESCO-Iowa Veterinary Supply . . . . .800 831-4828

Merritt . . . . .800-845-0411

Milburn Distributions . . . . .800-279-6452

Miller Veterinary Supply . . . . .800-880-1920

Nelson . . . . .800-843-3322

Penn Vet . . . . .800 233-0210

TW Medical . . .888 787-4483

VMS-Veterinary Medical Supply . . . . .800-533-8674

Vetpo . . . . .800-253-7280

Western Medical Supply . . . . .800-242-4415

#### CANADA

CDMV . . . . .800-668-CDMV

VetNovations .866-382-6937

Vet Purchasing . . . . .519-284-1371