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Subject: **MDR 1 Genotype Results**
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To: <mike@dustybootsfarms.com>
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MDR1* Genotyping Results

Mike Gould,

Your dog, "Dually" has been tested for the Multi-Drug Sensitivity mutation, the result is: Normal/Normal

Explanation of test results:

Normal/Normal- These dogs do not carry the mutation, and will not pass on the mutation to their offspring. These dogs would not be expected to experience unexpected adverse drug reactions to normal doses of ivermectin, loperamide (Imodium®), and some anticancer drugs.

Mutant/Mutant- These dogs carry the mutation and can not pass on a normal gene to their offspring. These dogs would be expected to experience toxicity after normal doses of loperamide (Imodium®), and some anticancer drugs, and high doses of ivermectin (greater than 50 micrograms per kilogram).

Mutant/Normal- These dogs carry the mutation and may pass on the mutant gene to their offspring. These dogs may experience toxicity after normal doses of loperamide (Imodium®), and some anticancer drugs, and high doses of ivermectin (greater than 50 micrograms per kilogram).

Problem Drugs

There are many different types of drugs that have been reported to cause problems in Collies, ranging from over-the-counter antidiarrheal agents like Imodium® to antiparasitic and chemotherapy agents. It is likely this list will grow to include more drugs as our research progresses.

Drugs that have been documented, or are strongly suspected to cause problems in dogs with the MDR1 mutation:

- Ivermectin (antiparasitic agent)
- Loperamide (Imodium®; over-the-counter antidiarrheal agent)
- Doxorubicin (anticancer agent)
- Vincristine (anticancer agent)
- Vinblastine (anticancer agent)
- Cyclosporin (immunosuppressive agent)
- Digoxin (heart drug)
- Acepromazine (tranquilizer)
- Butorphanol (pain control)
- Avermectin (a commercial pesticide)

Potential Problem Drugs

The following drugs may potentially cause problems when given to dogs that have the mutation. Biochemical studies have shown that this gene has the potential to act on over 50 different drugs.

- Ondansetron
- Domperidone
- Paclitaxel
- Mitoxantrone
- Etoposide

- Rifampicin
- Quinidine
- Morphine

We are investigating other drugs that may cause problems for these dogs.

Steve Bentjen
Veterinary Clinical Pharmacology Laboratory Manager

* PCR for this service is performed pursuant to an agreement with Roche Molecular Systems, Inc.
US and foreign patents pending for MDR1 testing.

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