



Version 1

Produced with  Scholar



Case of mortality in lambs from a Colombian flock

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Welcome to Creator, a web workspace that empowers you to create works that include a variety of media, including text, image, video, audio and any other file. This is why we call Creator a "multimodal workspace". As you will see, in this as well as other ways, Creator does a lot more than a word processor.

Creator is a space where you can give and be given feedback. This is why we call *Scholar* a "social knowledge" technology. This feedback is carefully organized by a person who we call a "Publishing Admin".

There are several ways you can read this work (and any work you create, or other creators' works when you are giving feedback):

1. Clicking the little arrows in the dark blue bar above, which will take you to the next or previous section of the work.
2. Clicking the printer icon in the dark blue bar, and then selecting either "Download PDF" or "View in Browser".
3. Navigating section to section, using the Structure tool (Creator => About this Work => Structure). Make sure you open out the subsections as you go.

(And by the way, *Welcome to Creator* is just a sample work which you can delete from your workspace if you wish, when you feel you know enough about how *Scholar* works.)

There are three other ways you can get to know about Creator:

1. Just click around, try things out, and if you are unclear about something, look for the little help [?] links.
2. Visit our [video tutorials and online guide](#).
3. Take the Learning Module, [Getting Started in Scholar](#).

For a brief introduction to Creator, see this [video tutorial](#).

The Creator Workspace

Case of mortality in lambs from a Colombian flock

Signalment

500 flock, cross-bred sheep, farm established 5 years ago with animals purchased from different locations. No vaccines ever used (not available in the country). Deworming has been done as a "blanket treatment to all animals" on a monthly basis with injectable levamisole, ivermectin and albendazole. Same farm has 40 beef creole cattle in different pastures never shared with sheep.

History

A total of 13 lambs between ages of 3 to 6 months died in August 2014, and according to the herdsman, with similar histories of eyelid paleness, bottle jaw, anorexia and severe weakness preceding death, or the animals were just found dead. He states that many newborns tend to be very small, weak, have high mortality and require bottle feeding because the dam is not producing milk. All the flock grazed together and spent 3-4 days in paddocks primarily comprised of Guinea

grass (*Panicum maximum*), and were housed at night in sheds with dirt floor pens and where some supplemental concentrate was provided in communal open troughs. Resting periods for grazed paddocks ranged between 30-40 days.

Physical Examination

About ¾ of the ewes have body condition scores of 1 or 2. Famacha scores are between 3-4 in most animals and a few with scores of 5. Three lambs have submandibular subcutaneous swelling (on palpation it feels like edema). No evidence of fecal soiling or nasal discharges. Occasional lameness.

Questions?

1. What does a body condition score of 1 indicate?

· It is an indication that the animal is emaciated (score 1) or very thin (score 2). On a herd level, it is the best surrogate marker for assessing malnutrition. A score of 2 is only considered optimum for ewes at weaning time, but for breeding and gestation an optimum score is 3-4. Condition scores of ewes are directly correlated with lamb survival. On average, a difference of one unit of condition score is equivalent to about 13% of the live weight of the ewe (Thompson and Meyer, 1994).

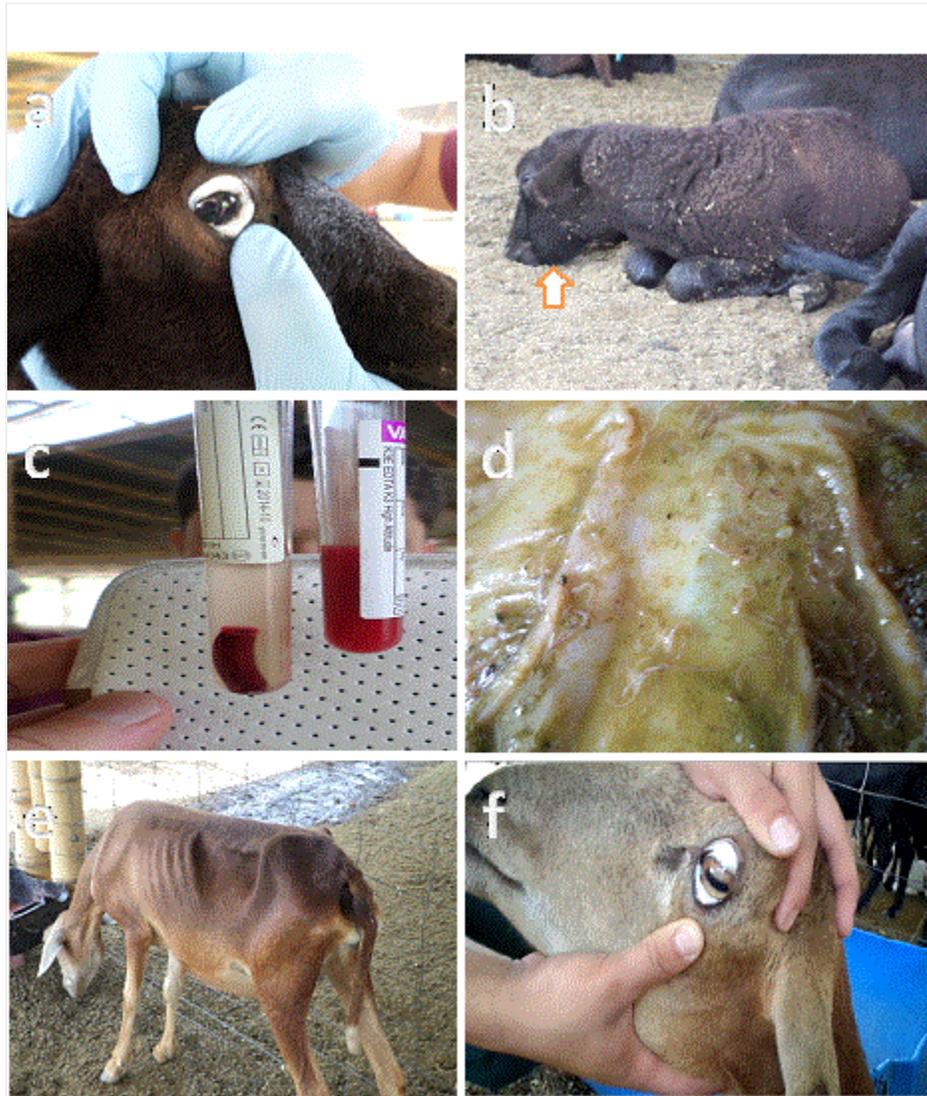
2. What is the Famacha score used for?

· **FAMACHA**® – an acronym formed from FAffa MALan CHArt – a system named in honor of one of its South African developers, Dr Francois “Faffa” Malan. This system uses a patented color chart against which the color of the inner surface of the lower eyelid is compared. The colors are 5 shades of red varying from red to very pale pink or flesh color, and they correspond to levels of circulating red blood cells. Bright red is correlated with normal red cell levels and the paler colors correlate with anemia or shortages of red blood cells. The GIN, *Haemonchus contortus*, is found in the abomasum of sheep and goats and feeds on blood. Large numbers of this worm cause anemia, poor performance, and even death. The FAMACHA® system is one method of targeted selective treatment and is applicable to *Haemonchus contortus* only. This is the most serious worm for sheep and goat producers across much of the United States.



Laboratory and necropsy findings:

Four month old lamb (photos a-d): Famacha score of 5 (a), bottle jaw (b), blood taken from lamb two hours prior to death was watery and produced a very small clot (c) with a PVC = 4.5% and total plasma protein = 2.5 g/dL. On necropsy, thousands of thread-like white worms (identified as *Haemonchus contortus*) were retrieved from the abomasal fluid (d). Fecal pellets were well formed in the distal rectum and had a FEC of 45,000 epg. Apart from severe paleness of muscles and internal organs, no other gross abnormalities were observed. Postpartum ewe with a body condition score of 1 (e), Famacha score of 5 (f), PCV = 8%, TP = 4 g/dL, and a fecal egg count of 13,050 epg. Fecal larval cultures confirmed *Haemonchus* to account for 97% of the total egg count. The animal had received fenbendazol and levamisol 2 weeks earlier and was found dead the day after the examination.



Questions?

1. List problems in order of importance:

- Rapid death in lambs
- Small newborns with high mortality
- Anemia
- Poor body condition
- Edema
- Heavy strongyle infection (FEC $\geq 8,000$ epg)
- Parasite resistance to anthelmintics highly suspected

2. What type of anemia would you suspect and what test would you do to further classify it?

- Anemia due to blood loss. They are usually regenerative but given the malnutrition status it could be non-regenerative. Test would be a Complete Blood Count.
3. How do you interpret FEC for strongyles, are there threshold levels that relate to clinical disease or specific production losses?
- Just like counts for coccidial oocysts, FEC for strongyles in general do not correlate well with clinical disease and/or production losses and you will not find specific cutoff points to establish the degree of infection or when to treat based on count numbers (Zajac, 2006). They have to be interpreted in light of other findings (ie., Famacha score). Typically, lambs and periparturient ewes are more susceptible and harbor greater number of strongyles; they would be the population at higher risk and the ones shedding the most eggs.
4. What is your tentative diagnosis in order of decreased importance:
- Clinical parasitism by the barber pole worm (confirmed by laboratory findings) associated with inadequate nutrition.
 - Other causes of anemia in sheep include: liver flukes (in adults), anaplasmosis, leptospirosis, copper toxicosis, Brassica ingestion.

5. Therapeutic plan:

5.1. Immediate objective:

- Blood transfusions to the 3 clinically affected lambs. This was performed to the 3 lambs with severe anemia and they responded favorably.

5.2. Long-term objectives: “control parasites” and “correct nutrition”

- What dewormer would you use?

Asking the owner which one has not been used would not really tell you whether resistance has occurred to that drug. He might have well imported the resistant worms when purchasing animals. Ideally do a Fecal Egg Count Reduction Test (FECRT). This was indeed performed and the results are shown below (See table 1).

Table 1. Results of the fecal egg count (mean egg, minimum-maximum) for Trichostrongylids at day 0 and 10 after treatment with several anthelmintics, and reduction (mean difference) and 95% confidence interval within each group.

Group (n=animals)	Mean egg (range)		Mean difference (95% CI)
	Day 0	Day 10	
Control (n=13)	7027 (100-29000)	7473 (0-23050)	-446 [(-3660) - 2768]
Albendazol (n=14)	8768 (100-36600)	8071 (0-29100)	696 [(-953) - 2346]
Levamisol/triclabendazol (n=13)	5792 (100-22900)	6126 (0-29550)	-335 [(-3970) - 3301]
Ivermectin (n=13)	7381 (50-35700)	7153 (50-40150)	227 [(-4302) - 4756]
Moxidectin (n=12)	8320 (50-42250)	2062 (0-7300)	6258 [(-777) - 13293]

Trichlorfon(n=24)*	8437 (50-40150)	5181 (0-19750)	3256 [(-617) - 7130]
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*The trichlorfon treatment was comprised of 24 animals from the ivermectin and albendazole groups, and was administered at time of fecal collection on day 10 of the latter groups, and repeated 6 days later.

Dosages: Control water; albendazole 3.5 mg/kg bw, sc; ivermectin 0.2 mg/kg bw, sc; moxidectin 0.2 mg/kg bw, sc; Levamisol 5 mg/kg bw, sc plus triclabendazole 10 mg/kg bw, oral; Trichlorfon 50 mg/kg bw, oral.

5.3. What does having a large RANGE or a "STANDARD DEVIATION" greater than the MEAN for the group indicate?

- Some animals have zero counts and others extremely elevated counts. In general, mature animals with a good plane of nutrition will develop acquired immunity with prolonged exposure and will be either resistant to infection (very low counts) or resilient (high counts with apparently no clinical consequence). In this case, the animals were sorted into five treatment groups according to fecal egg counts that were done 2 days earlier. The five animals with highest egg counts were placed randomly, one in each group, and so on until the formation of the five groups. The same was repeated until all groups had been formed such that they all began the test with a very similar average number of egg counts.

• 5.4. What drug/s still maintain efficacy?

- Moxidectin reduced FEC by about 75%, and trichlorfon only attained a 39% reduction. According to the FAO guidelines (FAO, 2004), when efficacy is below 90% there is resistance. Moxidectin is the only drug that may reduce a clinically significant infection and at this point (because resistance is building up) it should be reserved as a rescue drug for heavily infected animals.

5.5. List 3 general mechanisms of resistance that explain why antiparasitic drugs lose their efficacy?

- Inability to bind at the action site,
- Increased metabolism,
- Decreased penetration

5.6. Why is the oral route preferred over parenteral for most anthelmintics (ie., benzimidazoles)? Why should the drug be deposited with a balling gun in the back of the mouth? Or fast the animal overnight?

- All these questions are related to enhancing the efficacy of the anthelmintic. Animals grazing lush green pasture with very high water content have much faster gastric transit of digesta (=quick flow) and this leads to lower drug availability and reduced efficacy against GI nematodes (Ali and Hennessy, 1993). Fasting overnight will prolong residence in the GI and the overall bioavailability of the drug. Depositing the drug over the tongue prevents it from reflex closure of the esophageal groove that could dispense the drug into the abomasum and not the rumen (Zajac, 2006). Going directly into the abomasum will significantly reduce both, the overall amount of drug that will be absorbed, and time present are therapeutic concentrations.

• 5.7. How can you prolong the lifetime of dewormers?

- **TST - "Targeted Selective Treatment"** - Treatment of only those animals that will most benefit from treatment, leaving the rest of the flock or herd untreated. Worm numbers in sheep and goats are not uniform across members of the flock or herd with approximately 70-80% of the worms found in only 20-30% of the animals; the majority of the animals have relatively low worm burdens. TST strategies are directed toward the animals that are clinically affected by parasites, those animals most susceptible to disease, or those that are likely to contaminate the pasture the most. Examples of criteria that can be used to selectively choose animals for treatment include anemia (the FAMACHA© system); thin body condition; reduced live weight gains; elevated worm egg counts in feces; and below average milk production.

• 5.8. List some options to implement an Integrated Parasite Management

- Rotate with cattle or start grazing together.
- Introduce new forages with activity against roundworms
- Use innate immunity: introduce resistant breeds in the flock (St Croix, Kathadin)
- Resting periods that will break the cycle of the parasite.

For further strategies to break the parasite cycle watch some webinars from University of Maryland at: <http://www.sheepandgoat.com/recordings.html> on Integrated Parasite Management (by Susan Schoenian)

5.9. In this case, what recommendation would you provide to address the poor body conditions of the animals?

- · start by analyzing pasture for nutrients (TDN, protein, Ca, P),
- · separate animals according to nutritional needs
- · supplement to reach condition scores of 3-4,
- · provide adequate feeder space.

References:

Ali DN and Hennessy DR (1993) The effect of feed intake on the rate of flow of digesta and the disposition and activity of oxfenbendazole in sheep. *International Journal of Parasitology* 23(4):477-484.

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FAO 2004. Module 2. Helminths: Anthelmintic resistance, diagnosis, management and prevention. Guidelines Resistance Management and Integrated Parasite Control in Ruminants. FAO, Roma, p.78-118.

Shoenian Susan. University of Maryland. <http://es.slideshare.net/schoenian/integrated-parasite-management-ipm-in-small-ruminants>

Zajac AM (2006) Gastrointestinal nematodes of small ruminants: lifecycle, anthelmintics and diagnosis. *Veterinary Clinics of North America. Food Animal Practice* 22:529-541

The "Works" Listing

One of the innovative aspects of the *Scholar* technology is that there are no documents or files. Instead, there are "works" which are kept in a big database. Moving away from documents and files produces some huge advantages. One is that *Scholar* can reformat your work in a whole lot of ways—you'll see two already when you use the little print icon in the dark blue title bar: either a stunningly designed web page, or a beautifully typeset PDF.

Also, there are no folders. You can always find a work by searching for it. Or you can sort your works by tagging them—which is much better than having folders. While you can only put a document in one folder, you can tag a work in more than one way.

The "About This Work" Area

In the Creator space, you create things called "Works". A work can also be part of a "Project".

- *Work*: something you make in the Creator workspace, containing some or all of text, image, video and other media.
- *Project*: the phases a work goes through, from 1) drafting, to 2) feedback, to 3) revision, and finally to 4) publication. In order to give and get feedback, more than one person needs to be connected in a project. You have to be connected into a project if you are going to get feedback.

When you are part of a project, you can have one of three possible roles, or three ways in which you are connected to a work:

- *Creator*: someone who is responsible for making a work, and is credited for its making underneath its title.
- *Publishing Admin*: the person who designs a project, sets deadlines, arranges feedback, and publishes revised works.
- *Contributors*: the other people who are also involved in the same project and who will be asked to give you feedback on your work.

Collaborating in a Project

Creators can start works at any time, but if they do, they will not be connected into a project for peer feedback (which can include any or all of peer review, annotations and a publication recommendation). If you are part of a project, you must do it in an empty work which has been created for you by your publishing admin. You can reach this work in either of two ways:

1. You will receive a notification - see the Notifications area at the top of this screen. When you receive a notification, you will see a small orange alert. Click on that notification and that will take you right into the new, blank work where you are meant to write.
2. You will find a new, blank work in your works area. It may be called "Untitled", or it may have a title suggested for you by your publishing admin (Creator => Works).

When you reach or open your work, visit the "Info" tool where you can give the work a title of your own choosing, and enter other relevant information (Creator => About This Work => Info).

If your work is part of a project, you can also see useful information about that project (Creator => About this Work => Project):

- *Status*, or where your work is up to in the project.
- *Description*, or what the members of the project have been asked to do.
- *Timeline*, showing when things are due, from draft, to feedback, to revision, and finally to publication. Important note: all dates are advisory and you can submit drafts, feedback and revisions late. A red dot serves as a warning that you are late, and a record that you were late is kept in the Timeline.
- *Dialogue*, where you can communicate with your publishing admin at any time. This is a better place to connect with your publishing admin than the messages area in the top bar, because it is a special message about this work, that is kept with this work. For information about the Dialogue tool, see this [video tutorial](#).

Also, if you are part of a project, before you start, go to the rubric to see how your work is going to be evaluated, by other members (peers), or your publishing admin, or by yourself as a self-review (Creator => Feedback => Reviews => Rubric).

For a demonstration of how to submit your work, visit this [video tutorial](#).

Information about a Work

In the Info area (Creator => About this Work => Info), you can give your work a Title and Subtitle, upload a Work Icon, write an Abstract and list Keywords.

The Structure Tool

Use *Scholar's* Structure tool to plan out your headings and divide your work into sections or "elements" (Creator => About This Work => Structure). If you mouse over each heading in the Structure tool, you can use the tool to move whole sections (drag up/down), or create subsections (drag to the right/left). (*A tip*: never use the emphasis tool for headings or subheadings in *Scholar*.)

For a demonstration of how to use the Structure tool, see this [video tutorial](#).

Versions

In the Info area (Creator => About this Work => Info), you can give your work a Title and Subtitle, upload a Work Icon, write an Abstract and list Keywords.

The "Feedback" Area

One of the most powerful features of *Scholar* is that more than one person can give and receive feedback at the same time, and at any time. There's no having to pass files backwards and forwards. And the feedback is clearly structured and neatly organized. It's much more useful than traditional file-based word processors or other web writing spaces!

Here are some things that, as a creator, you need to know. When it is time for you to give feedback on other creators' works, you will receive a notification. You will see an alert in the Notifications area in the top bar. Click on the notification, and you will be taken directly to the work requiring your feedback.

Depending on the project settings made by your publishing admin, reviews may be anonymous or have the names visible of the creators or the people giving feedback.

When giving feedback you may be asked to work in one or more of three areas: Reviews, Annotations, or Recommendation. If your publishing admin has requested you to offer more than one of these kinds of feedback, you will be shown to have missed the feedback submission deadline until all two or three feedback requests are completed.

Reviews

When requested to write a review, read the rubric carefully (Creator => Feedback => Reviews => Rubric). Then take the "Review Work" tab (Creator => Feedback => Reviews => Review Work). Be sure to pull the slider across to give the work a number rating on each criterion. You must write at least something in every explanation box.

Go to the bottom of this panel and save (if you are not finished and want to come back later) or submit (if you have finished reviewing). Here you can write peer reviews (of others' works), and also self-reviews (of your own work). Once you have submitted you cannot make further changes to a review.

After your work has been reviewed, this is also where you go to see your results (Creator => Feedback => Reviews => Results).

To see how to review a work, visit this [video tutorial](#).

Annotations

To make an annotation, first select an area of text. Then make a comment, or suggest a change. If you are suggesting a change, indicate the type of change you are making (Creator => Feedback => Annotations).

For information on receiving annotations and reviews, see this [video tutorial](#).

Recommendation

This is where you say whether you think this work is suitable for publication, after revision (Creator => Feedback => Recommendation).

Checker

Use *Scholar's* unique "Checker" tool as you write (Creator => Feedback => Checker). Checker scans one element (or section) of the current version at a time. Unlike spelling or grammar checkers which sometimes tell you something is wrong when it is not, *Scholar's* checker only makes change suggestions, and these include synonyms, in case you may wish to change a word. By opening the little arrow beside each possible change, you can see an explanation of each suggestion. If you want to accept a suggestion, hover over the change and select the green arrow.

For instructions on how to use the Checker tool, see this [video tutorial](#).

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