MICHIGAN STATE UNIVERSITY

COLLEGE OF VETERINARY MEDICINE

Department of Large Animal Clinical Sciences

Abuelo's Lab

Lab Manual

EDITION	***MODIFIED SECTION(S)***	***DATE***	***COMMENTS***
01	*--*	*01/01/19*	*Initial*
02	*Several*	*04/07/21*	*Updates to reflect moving communications and data storage to MS Teams*

1 Welcome!

It looks like you recently joined the Abuelo Lab in Michigan State University's large animal clinical sciences department. That's great! We're really glad to have you here and will do what we can to make your time in the lab amazing. We hope you'll learn a lot about nutritional immunology, develop new skills (lab techniques, data analysis, writing, giving talks, etc.), make new friends, and have a great deal of fun throughout the whole process.

This lab manual was inspired by several others, and borrows heavily from them (e.g., this one, this one, and this one). It's also a work in progress. If you have ideas about things to add, or what to clarify, talk to me (Angel, the PI). When you join the lab, you're expected to read this manual and sign a form indicating that you have done so.

2 Expectations and Responsibilities

2.1 Everyone

Big Picture

Science is hard. But it's also fun. In the Abuelo's Lab, we want to make sure that everyone experiences a positive, engaging, hostility-free, challenging, and rewarding lab environment. To maintain that environment, we all have to do a few things.

- Work on what you're passionate about, work hard at it, and be proud of it. Be so proud of it that you have to suppress bragging (but it's ok to brag sometimes).
- Scientists have to be careful. Don't rush your work. Think about it. Implement it. Double and triple check it. Incorporate sanity checks. Ask others to look at your experiments, data, or analyses if you need help or something looks off. It's ok to makes mistakes, but mistakes shouldn't be because of carelessness or rushed work.
- If you do make a mistake, you should definitely tell your collaborators (if they have already seen the results, and especially if the paper is being written up, is already submitted, or already accepted). We admit our mistakes, and then we correct them and move on.
- We all want to get papers published and do great things. But we do this honestly. It is never ok to plagiarize, tamper with data, make up data, omit data, or fudge results in any way. Science is about finding out the truth, and null results and unexpected results are still important. This cannot be emphasized enough: *no academic misconduct!*

- Support your fellow lab-mates. Help them out if they need help (even if you aren't on the project) and let them vent when they need to. Science is collaborative, not competitive. Help others, and you can expect others to help you when you need it.
- Respect your fellow lab-mates. Respect their strengths and weaknesses, respect their desire for quiet if they need it, and for support and a kind ear when they need that. Respect their culture, their religion, their beliefs, their sexual orientation.
- If you're struggling, tell someone (feel free to tell Angel!). Your health and happiness come first. The lab looks out for the well-being of all its members. We are here to help. It's ok to go through hard patches (we all do), but you shouldn't feel shy about asking for help or just venting.
- If there is any tension or hostility in the lab, something has to be done about it immediately. We can't thrive in an environment we aren't comfortable in, and disrespect or rudeness will not be tolerated in the lab. If you don't feel comfortable confronting the person in question, tell Angel. In any case, tell Angel.
- If you have a problem with Angel and are comfortable telling him about it, please do! If you aren't comfortable, then tell a more senior lab member (for smaller issues) or another member of the department (for more serious issues).
- Stay up to date on the latest research. Consider subscribing to journal table of contents, create PubMed or Google Scholar personalized notifications, etc. Also consider following journals, societies, and scientists in the field on Twitter (Angel's handle: @angelabuelo).
- Remember that it is important to have a life outside of the lab, take care of your mental and physical health, and don't ever feel bad for taking time off work.

Small Picture

There are a few day-to-day things to keep in mind to keep the lab running smoothly.

- If you're sick, stay home and take care of yourself. Because you need it, and also because others don't need to get sick. If you're sick, reschedule your meetings and experiments for the day (or the next couple of days) as soon as you can. If you are in the middle of an experiment and something needs to be done, ask someone to do it for you (yes, you can ask Angel!). We will endeavor to help and support each other.
    - *We will cover later the importance of creating and maintaining detailed protocols and SOPs, but for now just remember that one day you might need someone else to undertake a procedure for you and they will need detailed instructions!*

- You aren't expected to come into lab on weekends and holidays, and you aren't expected to stay late at night. You are expected to get your work done (whatever time of day you like to do it). Nevertheless, some experiments/trials might require some after-hours work, that is part of the type of research that this lab does.
- Show up to your meetings, show up to samplings and farm visits, show up to your classes, and show up to lab meetings. You do not have to be in at 8 am every day – just show up for your commitments and work the hours you need to work to get stuff done.
- You are required to complete all the online training required by the University to work in the lab and with animals. When you join the lab, Angel or another senior lab member will instruct you about what training you are required to complete and also provide an on-site training. All this training must be appropriately documented. On-site training sheets must be updated annually.
- You also must follow all Environmental Health Safety (EHS) rules. We take these seriously and are subject to random inspections. Follow the rules!
- Make sure the door to the labs are locked if no one is inside. Turn off the lights if you're the last one leaving for the day.
- Keep the labs tidy. Drinking/eating inside the labs is strictly prohibited. No food or drink can be taken inside any laboratory nor can it be left outside in the corridor. Use the fridge/freezer in the graduate office/breakout room of the 3rd floor to store your food if needed. The table and chairs in the breakout room or next to the elevator can be used for drinking/eating.
- Dress code is casual (but you can dress up if you want!) but not too casual. When interacting with collaborators/visitors or presenting your work, don't wear pajamas and sweat pants but jeans are totally fine.
- Be on time. In fact, show up 15-20 minutes early to set everything up if that's needed. Also, be on time for your meetings: respect that others have packed days and everyone's time is valuable.

2.2 Principal Investigator

All of the above, and I promise to also…

- Support you (scientifically, emotionally, financially).
- Create a personalized mentorship plan tailored to your interests and career expectations. We will discuss these, and I will ask you to complete a mentor-mentee agreement.

Obviously, your interests and career expectations can change with time (for example, changing interest from a career in academia to a position in industry). If that's the case, it is important that you let me know as soon as possible so we can plan together what changes we might implement.

- Give you feedback on a timely basis, including feedback on project ideas, conference posters, talks, manuscripts, figures, grants.
- Be available in person and via e-mail on a regular basis, including regular meetings to discuss your research (and anything else you'd like to discuss).
- Give my perspective on where the lab is going, where the field is going, and tips about surviving and thriving in academia.
- Support your career development by introducing you to other researchers in the field, promoting your work at talks, writing recommendation letters for you, and letting you attend conferences as often as finances permit and you have generated data worth presenting.
- Help you prepare for the next step of your career, whether it's a post-doc, a faculty job, or a job outside of academia.
- Care for your emotional and physical well-being and prioritize that above all else.

2.3 Post-Docs

All of the above, and you will also be expected to…

- Develop your own independent line of research.
- Help train and mentor students in the lab (both undergraduate and graduate) when they need it – either because they ask, or because I ask you to.
- Assist with other ongoing research work at the lab when I ask you to.
- Present your work at departmental and college events, at other labs/institutions (if invited), and at conferences.
- Apply for grants that you are eligible (both fellowships -e.g., USDA postdoctoral- and for research support -e.g., Michigan Animal Health Foundation, CVM Endowed Grants, Michigan Alliance for Animal Agriculture, etc.-). Though I will only hire you if I can support you for the duration of your contract, it's in your best interest to get experience writing grants – and if you get them, you'll be helping out the entire lab (because you'll free up funds previously allocated to you) as well as yourself.
- Apply for jobs (academic or otherwise) when you're ready. I don't ask that you stay with us

for a minimum period of time. If the perfect work for you arrives, you have to take that opportunity. We will be sad for seeing you leave but really happy for you!!

  - *If you think you'd like to leave academia, that's completely ok, but you should still treat your post-doc seriously, and talk to me about your career interests so I can plan on how to best train you for a job outside academia.*

- Take advantage of as many training opportunities that are available on and off campus to increase your skill tool. Examples of such activities are grant-writing workshops and other activities organized by MSU Center for Academic and Future Faculty Excellence (CAFFE). If your participation in these activities comes at a cost, talk about it with me soon. If finances permit and you make a good argument about the benefits of the training for your career, I will be happy to support your participation.
- Challenge me (Angel) when I'm wrong or when your opinion is different and treat the rest of the lab to your unique expertise.

2.4 Graduate Students

All of the above, and you will also be expected to…

- Develop your dissertation research. Much of your work has to be done independently but remember that others in lab (especially Angel!) are there to help you when you need it. We will mentor you to develop and plan your hypothesis and experiments.
- Help mentor other students in the lab when they need it – either because they ask, or because I ask you to.
  - *I expect that graduate students that are more advanced in their programs help newer students. All graduate students (either PhD or MS) are expected to help mentor undergrads. They can also help you with your projects.*
- Present your work at departmental and college events, at other labs/institutions (if invited), and at conferences.
- Adhere to all the procedures and timelines of the Comparative Medicine and Integrative Biology (CMIB) graduate program.
- Plan the courses that you take with input from Angel and your other Guidance Committee comments. The CMIB Program Director(s) will also in occasions provide input to your class schedule.
- Apply for grants, if eligible. It's a valuable experience, and best to get it early.

- Think about what you want for your career (academia – research or teaching, industry, science writing, something else), and talk to Angel about it to make sure you're getting the training you need for that career.
- Make sure you meet all graduate program deadlines (e.g., for your exams and thesis) -- and make sure Angel is aware of them!
- ***Prioritize time for research***. Coursework and other extracurricular activities are important, but ultimately your research gets you your MS/PhD and prepares you for the next stage of your career.
    - *If you are a full-time student, you must consult with me before engaging in any activity that it is not compulsory for the CMIB program or your research, even if asked by another faculty member or administrator. For example, delivering a lecture, assisting in a class/wet lab, etc. are valuable experiences and I would generally support them. However, I will consider for each occasion where you are in your research and coursework to assess whether or not the proposed activity will distract you significantly from achieving your ultimate goal: Graduation!*

2.5 Undergraduate/DVM Students

All of the above, and you will also be expected to…

- Assist other lab members with data collection and analysis (unless you are working on your own independent project under the mentorship of another lab member, in which case you should work on that!).
- Develop your weekly schedule by talking to your graduate student mentor or your post-doc mentor. You should be coming in every week and scheduling enough time to get your work done.
- If you are earning course credit for research, you must also attend lab meetings when your schedule permits, present at one of these lab meetings, submit a write-up of your research by the end of the semester, and meet all other requirements that your program might have.

2.6 Lab technicians

All of the above, and you will also be expected to…

- Maintain the lab IACUC protocols and paperwork (e.g., archiving consent forms) when assigned.
- Oversee the hiring, scheduling, and training of undergraduate research assistants.
- Develop and maintain the laboratory SOPs database.

- Assist with participant recruitment and scheduling.
- Assist other lab members with data collection or analysis (typically you will be assigned to particular projects).
- Help to maintain an atmosphere of professionalism within the lab.
- Work on your own assigned research project(s).
- Assist with maintaining reagent/supply inventory and ordering supplies.

2.7 Visiting Scholars/Scientists

By the time you arrive in the lab, you probably have already discussed with Angel what the objectives of your time with us are. This category is tricky, as it includes people from various backgrounds, ranging from students to established independent investigators. Angel will work with you in developing a personalized plan of activities during your time. However, in addition to all of the above, and you will also be expected to…

- If relevant, maintain all the requirements of your visa status when MSU is your sponsor.
- Participate in all lab meetings and share your expertise and experiences with other lab members.
- Complete all required training by MSU and not engage in any type of work that requires institutional approval – Even if the project is already approved for animal use, we will need to add you to the protocol (and to do so, you'll need to have completed the training beforehand!)
- Maintain detailed records of your experiments/analyses (see use of laboratory notebooks section). The physical copy of the records **must** remain in the lab. With authorization from Angel, you might be allowed to take copies with you – You just need to ask! Most likely, the answer will be yes, but some projects might be protected by an institutional non-disclosure agreement.
- If your time with us results in a publication, you will need to discuss with Angel regarding what affiliation you will need to use. This will be assessed on a regular basis. However, if a significant part of the publications' work was performed at MSU and/or used lab funds, it is likely that you will need to list MSU as your affiliation (including your home affiliation as well is most likely to be fine!).

3 Code of Conduct

3.1 Essential Policies

The lab, and the university, is an environment that must be free of harassment and discrimination. All

lab members are expected to abide by the Michigan State University policies on discrimination and harassment, which you can (and must) read about here.

The lab is committed to ensuring a safe, friendly, and accepting environment for everybody. We will not tolerate any verbal or physical harassment or discrimination on the basis of gender, gender identity and expression, sexual orientation, disability, physical appearance, body size, race, or religion. We will not tolerate intimidation, stalking, following, unwanted photography or video recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome sexual attention. Finally, it should go without saying that lewd language and behavior have no place in the lab, including any lab outings.

If you notice someone being harassed, or are harassed yourself, tell Angel immediately. If Angel is the cause of your concern, then reach out to the department chair or another trusted faculty member in the department.

3.2 Taking Photos & Videos

We respect the privacy and comfort of lab members by only taking photos or video recordings of them with their explicit knowledge and consent. This is especially important in situations where a lab member would otherwise not be aware of you taking a photo and therefore cannot object if they do not want you to – e.g., if they are wearing headsets. To avoid ambiguity about when a lab member is vs is not aware of photos being taken, we ask that everyone obtain consent from lab members before taking photos or videos and obtain consent again before posting any images on social media. This is done to respect others' privacy and acknowledge that people have varying degrees of comfort related to being photographed and especially with having those photographs shared on social media.

The goal of this is to foster an environment where everyone feels safe to be who they are, take risks, and have fun, without worry or self-consciousness. If someone wants to be photographed doing something fun or silly in lab events, and consents to be photographed, by all means go ahead! Just please respect the privacy of those who do not want that.

On a related note, do not take pictures on farms unless you/we have explicit consent to do so. Also, don't bother the farm manager/owner for getting consent. Only the person in charge of the relationship with the farm (usually Angel) should request such permission. If you want pictures for any presentation, plan ahead of time. These are privately-owned animals and no picture should be used or posted online without authorization.

3.3 Scientific Integrity

3.3.1 Research (Mis)conduct

The lab, and MSU, is committed to ensuring research integrity, and we take a hard line on research misconduct. We will not tolerate fabrication, falsification, or plagiarism. Read MSU's policies on the conduct of research carefully (main page here, institutional policy here, more information here).

A big problem is why people feel the need to engage in misconduct in the first place, and that's a discussion that we can have. If you are feeling pressured to succeed (publish a lot, publish in high impact journals), you should reach out to Angel and we can talk about it – but this pressure is something we all face and is never an excuse to fabricate, falsify, or plagiarize. Also, think about the goal of science and why you are here: you're here to arrive at the truth, to get as close as we can to facts about the brain and behavior. Not only is research misconduct doing you a disservice, it's also a disservice to the field. And it risks your entire career. It is never right and never worth it. *Don't do it!*

3.3.2 Reproducible Research

If you gave someone else your raw data, they should be able to reproduce your results exactly. This is critical, because if they can't reproduce your results, it suggests that one (or both) of you has made errors in the analysis, and the results can't be trusted. Reproducible research is an essential part of science, and an expectation for all projects in the lab.

For results to be reproducible, the analysis pipeline must be organized and well documented. To meet these goals, you should take extensive notes on each step of your analysis pipeline. This means writing down how you did things every step of the way (and the order that you did things), from any pre-processing of the samples, to analyses, to running models, to statistical tests, etc. It's also worth mentioning that you should take detailed notes on your experimental design as well. Additionally, your code should also be commented, and commented clearly. We all know what it's like to sit down, quickly write a bunch of code to run an analysis without taking time to comment it, and then having no idea what we did a few months down the road. It's also imperative that you maintain appropriate records (both in paper and electronic) of your results and analyses. In fact, you must keep records of both your statistical methods/code and the output. Also, comment your code so that every step is understandable by an outsider.

Reproducibility is related to replicability, which refers to whether your results can be obtained again with a different data set. That is, if someone ran your study again (with a different group of animals), do they get the same results? If someone ran a conceptually similar study, do they get the same results? Science grows and builds on replicable results – one-off findings don't mean anything. Our goal is to

produce research that is both reproducible and replicable.

3.3.3 Authorship

We will follow MSU's guidelines with respect to authorship, which are based on the International Committee of Medical Journal Editors ones:

> ***Authorship**: A person shall qualify as an Author provided the following conditions are satisfied:*
>
> - *Participation in conception and design of the creative work, study, review, analysis **or** interpretation of any data.*
> - *Participation in the drafting of the creative work or manuscript or in the editing of the creative work or manuscript.*
> - *Final approval of the version of the creative work or manuscript to be published.*
> - *Ability to explain and defend appropriate portions of the work or study in public or scholarly settings.*

At the start of a new project, the student or post-doc taking on the principal role can expect to be first author (talk to Angel about it if you aren't sure) as long as they write it up. Angel will typically be the last author, unless the project is primarily under the guidance of another PI and Angel is involved as a secondary PI. Students and post-docs who help over the course of the project may be added to the author list depending on their contribution, and their placement will be discussed with all parties involved in the paper. If a student or post-doc takes on a project but subsequently hands it off to another student or post-doc, they will most likely lose first-authorship to that student or post-doc, unless co-first-authorship is appropriate. All of these issues will be discussed openly, and you should feel free to bring them up if you are not sure of your authorship status or want to challenge it.

If disagreements over authorship occur (e.g., who has a right to be an author, the order of authors), it is the initial duty of the Lead Author (usually Angel) to find a resolution in consultation with the other participating authors. If resolution within the immediate author group cannot occur, any concerned party from the group is encouraged to contact a disinterested third party acceptable to all authors. At MSU, this can be resolved by the Research Integrity Officer.

Old projects: If a student or post-doc collects a dataset but does not completely analyze it or write it up *within 3 months* after the end of data collection, Angel will re-assign the project (if appropriate) to another person to expedite publication. If a student or post-doc voluntarily relinquishes their rights to the project prior to the 3-month window, Angel will also re-assign the project to another individual. This policy is here to prevent data (especially data from expensive analyses) from remaining unpublished but is meant to give priority to the person who collected the data initially.

3.3.4 Animal Research Use

Adherence to approved IACUC protocols is *essential*, and non-adherence can lead to severe consequences for the entire lab (i.e., we may lose permission to run any research on animals). All lab members must read and comply with the IACUC Animal Use Form, consent form, and research summary for any project that they are working on. If you are not listed on the project, you cannot undertake any procedure that involves animals.

Lab members must complete all the required training and give Angel a copy of the courses completed list. To be added to an existing protocol, talk to Angel (you will need to have completed the required training beforehand). If your project does not fall under the scope of a current protocol, talk to Angel and about writing a new one or filing an amendment to an existing one. You *must* ensure that you have IACUC approval to run your study before you begin (which means that you either submitted an IACUC protocol that got approved, or your name was added to an existing or amended protocol).

If there is any adverse event with any animal involved in one of our studies, you must notify Angel as soon as possible. We may need to report this information to the IACUC and/or funding agencies.

4 Lab Resources

4.1 Communications

Microsoft Teams will be used as the primary means of lab communication. There is one Teams workspace for our lab that will contain appropriate channels. These channels would be general (open to all lab members), project-specific (open only to people involved in the project), or individual. All trainees will have a specific channel for communicating with Angel.

Notes for the Abuelo Lab Workspace. When posting messages or looking for updates, check the appropriate channels. Try to keep each channel on topic, so that people can subscribe only to the channels that concern them. For messages to one person or a small group, use direct messages. If you must send messages that include out-of-lab recipients, use e-mail. If it's an emergency and Angel isn't responding on Teams, e-mail him.

Full-time lab members should install MS Teams on their computers and/or phones. Part-time lab members should also check Teams regularly. You should of course feel free to ignore Teams on evenings, weekends, and holidays – and Angel probably will, too! The whole purpose of using a specific app for communicating is being able to turn off notifications outside of working hours. Hence, only use the phone (including text messages) or email for very urgent matters.

4.2 Storage of files

We will use SharePoint to store all files relative to the research. All records pertaining to the lab **must** be stored in the Lab SharePoint, *never on your personal drive*. The reason for this is that all your work belongs to MSU (and therefore to the lab) and we need to ensure that we still have access to those files when you leave the University. Each Teams channel has an associated SharePoint (the "Files" tab in that channel). Please store the files in the relevant channel/SharePoint, and make sure that Angel is an owner of the channel (e.g., if you store the files in a personal channel you created, this defeats the purpose of the lab always having access to the files).

A very strong recommendation is to synchronize the SharePoints you primarily work with onto your computer's drive using OneDrive. This way, you can operate as if the files were in your computer, but everything is being synchronized and updated onto SharePoint. Read here about this feature.

An important added benefit of storing files this way is that it allows for sharing and accessing the same version of a file without the need of circulating several versions of document via email. This way, we will all always be working in the most updated version. When sending someone a document for review (e.g., word document, excel spreadsheet, powerpoint presentation, etc.) it is always better to share the link to the file in SharePoint than to attach the actual file. Use a link even if communicating via Teams.

4.3 Calendars

We will all try to keep our Outlook calendar as much up-to-date as we can. This will facilitate scheduling meetings and activities. There is also a shared Outlook calendar for everyone to put when they will be away and the reason (e.g., holidays, conference, etc.). Please only add your trips/holidays when the appropriate paperwork has been approved by Angel and the Department.

4.4 E-mail

Remember that the preferred method of communication among lab members is Teams. However, when e-mailing due to work/lab related matters, you must use your msu.edu email address and not your personal (e.g., Gmail, Yahoo) one. Always follow the MSU guidelines on institutional e-mail use, available here.

5 General Policies

5.1 Use of lab resources

It is our responsibility to keep all the equipment and lab space functioning properly. We will strive to maintain all our equipment well maintained and regularly calibrated. Hence, if you notice that the calibration of any equipment is expired, let Angel know. Also, Angel will distribute tasks among the lab

members for the adequate running of the lab, as well as to fulfill all EHS requirements. There will be a list of tasks to be completed daily, weekly, monthly, etc. and these will be rostered among the lab members. You might also be asked to contribute to the tasks of other labs if using their space/equipment regularly.

There is no cleaning or re-stocking fairy in the lab. Hence, you must always keep your workspace tidy, clean after yourself, re-stock any supplies that might be running low, emptying rubbish/biohazard bags, etc. Just use common sense, no one should know that you have been working there once you've finished. You wouldn't like to have to clean up someone else's mess before starting to work, so don't do that to your colleagues!

5.1.1 Laboratory computers

The computers that are found in the laboratories (either from the Abuelo Lab, in labs from other PIs, or in the core shared lab) are destined to operate different pieces of lab equipment and, should only be used for other purposes accidentally. Most likely, the computers are password-protected. Only authorized users should know the password and you are not allowed to share it with other users unless you are certain that the person is authorized to use the computer/equipment.

Similarly, the printers connected to the various PCs are only for laboratory use (printing results, lab templates, etc.). Graduate students are to use the printer in the graduate students' office for printing out papers, forms, class materials, etc.

5.1.2 Use of resources from other labs and shared equipment

We are very fortunate of working in a very collegiate and highly collaborative environment. For conducting our experiments, we have the luck of having access to several pieces of equipment that belong to other PIs or that have been collectively purchased. Particularly, we collaborate significantly with Dr. Sordillo's lab. When needing to use a space or equipment from another group you ***must*** ask for permission (Jeff Gandy is the contact person for Dr. Sordillo's lab) and it is imperative that you get trained in the use of each specific piece of equipment and follow the lab's rules for using, booking, maintaining, etc. the equipment. If you will need to use a piece of equipment several times, also let Angel know as then some arrangements with the PI might need to be organized to contribute to the maintenance, etc. of the equipment that you are using. When working at other lab, I expect you to follow their instructions as they were my own!

Similarly, when using the equipment in the core/shared lab, it is important to follow the rules for each machine. Always remember to sign up and book the equipment that you need if there is a booking system (this is collegiate and good for you, because you don't want your experiment to be stopped

because someone else had indeed booked the equipment and you have not). If you don't know, always ask and ***don't assume!!***

Also, depending on the use you do of some spaces/equipment, you might be added to the roster of other labs to keep things running (checking freezers, restocking, making solutions, etc.). Otherwise it will be unfair to just use the resources but have someone else do the dirty work. If someone asks you to do any of these tasks, I expect you to do it.

Similarly to our own lab space, but more importantly when using someone else's space/equipment, you should leave it in the same or better condition that you found it. If someone notices that you have been there, it must be because you left everything cleaner and tidier. If anything breaks or starts to malfunction, let the person responsible for that lab/equipment and me know ASAP. I understand that things can break, but not taking responsibility is not appropriate.

To maintain the collegiate atmosphere, we will also be generous in letting other researchers use our space and equipment when not in use by us. This, however, needs to be approved by Angel. If any researcher (including fellow graduate students from other labs) asks you to use Angel's lab or equipment, direct them to Angel prior to any use. As a rule of thumb, however, the access to the "clean" lab (G352) is only for people of the Abuelo's lab and other few users authorized by Angel.

5.2 Hours

Being in lab is a good way of learning from others, helping others, building camaraderie, having fast and easy access to resources (and people) you need, and being relatively free from distractions at home (e.g., your bed or Netflix). That said, hours in academia are more flexible than other jobs -- but you should still treat it as a real job (40 hours/week) and show up to the lab. My primary concern is that you get your work done, so if you find that you are more productive at home (lab-mates and fellow graduate students can be chatty sometimes), feel free to work at home occasionally. If you have no meetings, no experiments, and no other obligations that day, it might be a good day to work at home – but you can't do this all the time, and I expect to see everyone in the lab on a regular basis. If you plan to work from home, you must record this on the shared Outlook calendar, so that everyone knows not to expect you in the lab and to reach you over Teams/email/phone if needed.

The only exception to this is lab technicians / research assistants, who must keep more regular hours and be in lab according to their contract and working schedule (excluding vacations, doctor appointments, family issues, etc.). Full time lab technicians / research assistants should be in about 8 hours a day, starting around 8am or 9am and ending around 4pm or 5pm. However, there is some flexibility on this as some experiments might require an early start or coming into the lab later in the evening.

For graduate students, I understand having to be away for classes and other obligations (seminars, etc.), but show up to the lab on a regular basis when you don't have those obligations. Also, remember to check with me before agreeing to participate in any extra-curricular activity during regular working hours.

To encourage lab interaction, try to be in most weekdays during 'peak' hours (assuming no other obligations) – e.g., between 11am and 4pm. This is not a hard rule, you can work at home occasionally, and I understand other obligations. But keep it in mind.

5.3 PI Office Hours

In addition to weekly meetings (see below), and occasionally dropping by the lab, you can find Angel in his office. His door is almost always open; if it is, feel free to ask for a chat. He will say yes most of the times, though sometimes he can only spare a couple of minutes. If his door is closed, assume that Angel is either gone, in a meeting in his office, or does not want to be disturbed – so please send a message (Teams or e-mail) rather than knocking.

The best way to ensure proper sit-down time is to request a meeting with him. Remember that Angel also has teaching and service responsibilities and might be away on meetings or on farms.

5.4 Meetings

5.4.1 Weekly Lab Meetings

Weekly lab meetings (~1-1.5 hours each) are meant to be a forum for trainees to present project ideas and/or data to get feedback from the rest of the group. Projects at any level of completion (or even not yet started!) can benefit from being presented. These lab meetings can also be used to talk about methods, statistical analyses, new papers, and career development. For paper discussions, everyone must come to lab meeting having read the paper and prepared with comments and questions to contribute. Some weeks we may explore a particular issue and have people read different papers – in that case, come to lab meeting having read your paper and be prepared to summarize it for the group.

Each trainee (research assistant, students, post-docs) is expected to present at least once every semester. These meetings are informal, and you can do what you wish with your slot – just be prepared to contribute something substantive. Lab members are also expected to attend every meeting (obviously, illnesses, doctor appointments, family issues, etc. are a valid reason for missing a meeting). Undergraduate students are encouraged to attend as often as possible (assuming it fits in their course schedule).

We will also frequently have/attend joint lab meeting with Dr. Sordillo's lab or other faculty in the department – these may be combined with our weekly lab meeting or an additional meeting. We will

also use lab meeting (or ad-hoc scheduled meetings) to prepare for conference presentations and give people feedback on job talks or other external presentations.

Our lab meeting agendas, notes, presentations, and files will be kept in the #lab-meetings channel on Teams. Unless it is a personal presentation (e.g., job talk), the slides should be uploaded onto Teams so that everyone can access them at a later time.

5.4.2 Individual Meetings

At the beginning of each semester, we will set a schedule for regular meetings. Each full-time lab member (RAs, graduate students, post-docs) will have a one-hour slot set aside to meet with Angel. If scheduling conflicts arise (e.g., because of travel), we can try to reschedule for another day that week. If there is nothing to discuss, feel free to cancel the meeting or just drop by for a brief chat. Angel might become very busy and it is your responsibility to try to (re-)schedule meetings or at least remind Angel if this needs to happen.

Angel will meet with undergraduate students every other week (or according to need); post- docs and graduate students should meet with their undergraduate mentee on a regular basis.

5.5 Deadlines

One way of maintaining sanity in the academic work is to be as organized as possible. This is essential because disorganization doesn't just hurt you, it hurts your collaborators and people whose help you need. When it comes to deadlines, tell your collaborators as soon as possible when you know when a deadline is, and make sure they are aware of it the closer it gets. Don't be afraid to bug them about it (yes, bug Angel as well).

Give Angel *at least* one week's notice to do something with a hard deadline that doesn't require a lot of time (e.g., reading/commenting on conference abstracts, reviewing a poster, filling out paperwork, etc.). Give Angel *at least* two weeks' notice to do something with a hard deadline that requires a lot of time (e.g., a letter of recommendation). For manuscript revisions and invited paper submissions (which have hard-ish deadlines), give him as much time as you can, because these will require multiple back-and-forths.

For manuscript submissions (i.e., no hard deadline), you can still bug Angel to give you feedback if he hasn't responded in a week or two – papers are important and publishing our results in a timely fashion is one of the lab priorities!

5.6 Presentations

Learning to present your research is important. You can reach a lot of people at conference talks and posters. Also, if you plan on staying in academia, getting a post-doc position and getting a faculty

position both significantly depend on your ability to present your data. Even if you want to leave academia, presentations are likely to be an important part of your job. Additionally, every time you present your work, you are representing not just yourself but the entire lab.

It is therefore highly encouraged that you seek out opportunities to present your research, whether it is at departmental, college, or CMIB talk series and events, to other labs (within or outside of MSU), at conferences, or to the general public. However, you need to seek permission from Angel to present any of the lab's projects. If you are going to give a presentation (a poster or a talk), be prepared to give a practice presentation to the lab at least one week ahead of time (two weeks or more are advisable for conference presentations, and *many* weeks ahead of time are advisable for job talks, which require much refining – do not leave those to the week(s) prior to your presentation!!). Practice talks will help you feel comfortable with your presentation and will also allow you to get feedback from the lab and implement those changes well in advance of your real presentation.

Templates for posters will be available, and you can use those as much or as little as you'd like. Some general rules for posters should be followed: minimize text as much as possible (if you wrote a paragraph, you're doing it wrong), make figures and text large and easy to see at a distance, label your axes, and make sure different colors are easily discriminable. Other than that, go with your own style.

Angel is also happy to share slides from some of his talks if you would like to use a similar style. You'll get a lot of feedback on your talks in any case, but other people's slides might be helpful to you as you are setting up your talk. As with posters, feel free to go with your own style as long as it is polished and clear.

5.7 Recommendation Letters

Letters of recommendation are extremely important for getting new positions and grants. You can count on Angel to write you a letter if you have been in the lab at least one year (it's hard to really know someone if they have only been around for a few months). Exceptions can be made if students or post-docs are applying for fellowships shortly after starting in the lab.

If you need a letter, notify Angel as soon as possible with the deadline (see 5.5 above for guidance), your CV, and any relevant instructions for the content of the letter. If the letter is for a grant, also include your specific aims. In some cases (especially if short notice is given), you may also be asked to submit a draft of a letter, which will be modified based on Angel's experience with you and anything else that has to be added. This will ensure that the letter contains all the information you need, and that it is submitted on time.

5.8 Data Management

5.8.1 Laboratory notebooks

You will be given a lab notebook when you start working in the lab. It is imperative that you keep detailed records of all the steps that you take in your experiments, whether these related to the study design (e.g., power size calculations), animals of the study, laboratory analyses, statistical analyses, etc. As mentioned above, you should document everything so that a new person can understand what you have done and why. The instructions of the notebooks should be followed (e.g., signing every page, listing all the experiments, etc.). Good guidelines for keeping laboratory records can be found here, here, here, or here. Completed notebooks will be stored in the lab. Once you leave the lab, you must again re-check that everything has been adequately documented and commented. All your notebooks must remain in the lab (in most instances, you will be welcomed to take copies with you – though you need to check with Angel first, as a confidentiality agreement could make that not possible).

5.8.2 Laboratory SOPs

Whether you have created/validated a new method or just modified/tweaked an existing protocol, you must develop/update a Standard Operating Procedure. These will be kept electronically in SharePoint. Use the same structure as the other ones and when updating it, fill up the "version table" to document when it was last updated, by whom, and the reason for the update.

Maintaining detailed and up-to-date SOPs benefits you and all your lab-mates, and also increases the reproducibility of your data. If we are not able to replicate your experiments in the same lab, how are other research going to be able to reproduce your experiments?

5.8.3 Electronic datasets

As mentioned before, all the files and data of your experiments must be stored on SharePoint, ***never on your personal one***. New SharePoints will be created for projects as needed. You are required to maintain these well organized and as much up-to-date as possible (see synchronization of SharePoint). This organization must be clear not only for you but to everyone that accesses the folder during or after the life of the project. The best is to create a document with instructions of what it stored in each folder.

When you leave the lab, your projects directories and files should be clear and with instructions, so that other people can look at your data and code. You *must* do this, otherwise your analysis pipeline and data structure will be uninterpretable to others once you leave, and this will slow everyone down (and cause us to bug you repeatedly to clean up your project directory or answer questions about it).

Archiving Inactive Datasets: Before you leave, or upon completion of a project, you must archive old datasets and back them up. We will develop the instructions for this when we reach our first inactive

dataset.

5.8.4 Sharing of data, papers, and information

Within lab, you can share your data whenever you like. But do not share your data, experiments, etc. with the outside world until you think (and Angel agrees) that the lab has finished working with it. This gives us an opportunity to work with the data to meet our needs (including grant needs!) before releasing it for other people to use.

When appropriate, we will also upload our datasets to appropriate repositories (e.g., RNA-Seq data). This will be assessed on a one-on-one basis by Angel and will usually take place at the time of submission to a journal.

We will also share our work with the world once they are accepted. This will include uploading the information and final pint to ResearchGate and other repositories. Also, you should share the PDF of your articles with anyone that asks you (however, you do need to check with Angel before sharing other data or details).

6 Funding

Funding for the lab currently comes from Angel's start-up package from Michigan State University, the U.S. Department of Agriculture, the Michigan Alliance for Animal Agriculture, the Michigan Animal Health Foundation, and some contracts with industry.

At some point, you will likely be asked to provide data, figures, etc. for a grant Angel is writing, and/or provide feedback on the grant. Relatedly, you are entitled to read any grant Angel has submitted, whether it is ultimately funded or not. Aside from being a good opportunity to learn how grants are written, this will also allow you to see his vision for the lab in the years ahead. Feel free to ask Angel to see any of his grants.

6.1 Purchasing of supplies

Angel will, initially, oversee all the purchases and assign the costs to the relevant accounts (you are not to make any charge to a lab account without Angel's approval). Once the lab grows, this task might be delegated to a lab manager. Please plan ahead when you need to purchase something, as some reagents, materials, etc. take some time to arrive. Also, be conscious that research supplies are generally expensive and most come with a short shelf-lifetime. Hence, just ask for those things that you need in the amount that you will feasible consume before the reagents are expired.

There is a "Request Supplies" Tab in the General channel of the Abuelo Lab Teams. You need to document there what you want Angel to order. Angel will regularly make purchases once or twice per

week. If you need to make a rush purchase, you need to fill up the spreadsheet and let Angel know through Teams that this is an urgent item. However, try to avoid these purchases as much as you can, as these usually have additional shipping costs.

Once the goods have arrived and they are appropriately stored, you need to document in the same spreadsheet the date they were received and where they are being stored (e.g., 3rd shelf, -20 freezer G356 lab).

6.2 Purchasing of equipment

This process usually takes more time and thought as it usually means a significant money investment. However, I am constantly seeking for ideas of new equipment that could streamline our work, make it more accurate, and/or allow the lab to expand the methods that we currently use. Hence, if you come across any piece of equipment that it might be useful / beneficial for your work, please share it with me. I will evaluate this and if I see the benefit, I will explore what the best option to purchase it. This might be a solo purchase or exploring buying it with one or a few other researchers, etc. Don't be shy!

7 Revision of the lab manual

I will strive to keep this manual as up-to-date as possible and to always keep the latest version available online to all the lab members. As the lab evolves, new things will be needed to be added and some might become obsolete. You are welcome to suggest Angel new things to include in the manual or things that could be changed for a better optimization of the procedures (you will probably be more up-to-date with the different technologies available than I am!).

8 APPENDIX A

MICHIGAN STATE UNIVERSITY | College of Veterinary Medicine

Lab Manual Signature Form

I confirm that I have read the lab policies laid out in the Abuelo's Lab manual. I raised any questions or concerns about them with Dr. Angel Abuelo, and those discussions have alleviated my concerns and answered my questions. I agree that I will abide by the policies set forth in the manual.

Printed name: _____ Lab Role: _____

Signature: _____ Date: _____

9 APPENDIX B

Abuelo Lab Mentor-Mentee Agreement

Mentee's name: _____

Position:_____

Expected duration: From:_____to: _____

E-mail address: _____

Alternative e-mail address (optional): _____

Phone number with area code: _____

Welcome Message:

Welcome! It is a pleasure to have you join our research group; it is our major goal to give you the conditions and opportunities to learn and grow professionally. We are committed to help you to achieve your academic and professional goals. The objectives of this agreement are: 1) to provide you with clear information on what we will be able to offer you, 2) to explain what we will expect from you, and 3) to give you an opportunity to share your expectations and previous experience. The goal of this agreement is to help us achieve the best lab environment possible. We hope that you will join our efforts to have a professional and healthy work environment.

You must familiarize yourself with the Lab Manual and follow all the lab policies. You will also need to sign another form agreeing to abide by these policies.

Laboratory Overview:

The overall research goal of our laboratory is to further our understanding of dairy cattle nutritional immunology and to improve animals' resistance to disease in order to improve animal well-being and the efficiency of dairy operations. Currently, our laboratory has a focus on neonatal calf health. The lab has broad interests, which include, but are not limited to:

- Understanding the mechanisms by which oxidative stress impacts the functionality of the immune system;
- Improving animals' immune function via nutritional or other supplementation strategies so that antimicrobial usage is reduced;

- Understanding nutritional factors that affect immune function and impact animal health;
- Improving accuracy, precision, and reducing time and cost of laboratorial methodologies as well as evaluating new experimental techniques both in the lab as well as on the field.

This is what you should expect from me and fellow lab members:

- Communicate clearly what we expect from you.
- Give you honest feedback (positive and negative) in a way that is constructive and helpful for your professional growth.
- Respect your points of view and listen to your suggestions.
- Give you advice and guidance on your current and future projects and work with you on a career plan, setting realistic short and long-term goals, and assessing your progress towards them.
- Incentivize and foster critical thinking.
- Help you adapt to our lab culture and to comply with University's requirements, and help you beyond the lab to the best of our capabilities.
- Provide a safe work environment and proper safety training.
- Strive for excellence in the work place.
- Provide equal opportunities to all lab members and enforce that all lab members comply with the rules of the lab.
- Provide commensurable salary/assistantship and benefits.
- Provide as many days of vacation per year as stipulated in your contract, which should be planned at four months ahead of time in order to avoid conflicts with classes, conferences, and research projects.
- Strive to provide you with lab supplies, good equipment, office space, animals and infrastructure for proper research.
- Encourage you at work and help you achieve a balanced and healthy lifestyle.

This is what **I** expect from **you** and your fellow lab members:

- Communicate clearly your expectations and express your satisfaction (or lack of it) about the work that you are doing, my mentorship, and about your co-workers.
- Be honest and ethical. You must take some ethics training/course or participate in an ethics

workshop.

- If you, as undergraduate, graduate student, postdoc, or visiting scientist are the leading person in a project, I expect that you will be responsible for writing the research manuscript *in a timely manner*. The first author is the person who contributed the most to the final version of the manuscript, which includes experimental design, running the experiment(s), data collection, analysis, and writing the manuscript. If you are not proactive in writing and editing the manuscript in a timely manner, *I will assign other lab member* to work on the manuscript and that person will be the first author if their contributions are greater than yours. If you leave this institution, you will have a deadline to finish your manuscript in a way that it is acceptable for publication; typically, this is around 3 months. If you fail to do so, another lab member, including me, will take the lead, and consequently will be the lead author in the manuscript. While I welcome constructive discussion about contributions, I have the authority to decide who provided the greatest contribution to the final version of the manuscript and I will assign the first authorship. Your opinion will be carefully considered; however, the final decision will be mine. Remember, publishing your result findings in a timely manner is part of responsible conduct of research, and I expect all members and visiting scientists of my lab to comply. If a conflict arises that cannot be solved within the lab, this should be raised and handled by MSU's Research Integrity Officer.
- Be polite and respectful of others (there will be no tolerance with discrimination against gender, sexual orientation, race, religious beliefs, political view, culture, and country of origin).
- Be proactive, responsible, and reliable.
- Be available and easy to reach. You must inform me your class schedule. Please read and follow the lab policy on working hours. There is some flexibility, but if you are employed or enrolled full-time, you should be working 40h/week.
- Be conscious about laboratory and University's resources.
- Ask questions when you are not sure about something.
- Be professional, accept and analyze constructive criticism.
- Be a critical thinker and contribute intellectually to the projects with which you are involved.
- Ability to interact positively with fellow team members, cooperating and collaborating with other's projects.
- Be enthusiastic and committed to excellence in the working place.
- Take time off, relax, and aim for a balanced and healthy lifestyle.

Trainee-Mentor Questionnaire:

1. Please, list what you would like to learn and achieve while working in the lab. You may list general topics as well as specific learning goals. You may also specify particular skills that you would like to develop.

2. Please, list what – in your opinion, are the biggest challenges to achieve your learning goals.

3. Please, list your major strengths.

4. Please, list what you think you could improve upon.

5. Please, list your expectations about my mentorship, in other words, what do you expect me to do to help you achieve your learning goals?

6. Please, list your roles on achieving your learning goals.

7. Please, list some previous trainee-mentor experiences (no need for names), good and bad.

8. Please, list some previous teamwork experiences (no need for names), good and bad (what worked well and what could have been improved?).

9. What are your long-term career goals?

10. Do you have a specific project/area that you would like to work on?

11. Do you prefer working with animals or in the lab? Why?

12. Do you have any medical or physical condition that prevents you from working with animals or in the lab?

13. Have you mentored anyone before? If yes, please specify (no names needed).

14. Do you have interest in developing teaching skills? You may also share any previous experience with teaching if you have any.

15. Have you had any training on research ethics, authorship, data storage, data ownership, or notebook keeping?

16. Are you familiar with the research culture in the USA? Do you know what a tenure track is? For instance: the importance of research funding, publication records, and teaching evaluations.

17. Is there any other issue that you would like to discuss that was not mentioned so far?

18. Do you have any comments or suggestions to improve this document?

By signing this agreement, I hereby attest that I have read and understood the information provided to me regarding my rights and expectations of working in the laboratory of Dr. Angel Abuelo.

_____	_____	_____
Mentee's signature	Date	Dr. Angel Abuelo