Links and information from Dr. Christine Jones:

Human Health

The American Gut Project, involving the analysis of faecal samples from over 11,000 citizens, found people who consumed 30 or more different plant foods per week had more diverse gut microbiomes than people who consumed 10 or less. It was also discovered that the microbiome of individuals consuming grain-fed meat resembled the profiles of individuals on a course of antibiotics. (Hint: consume only grassfed meat plus a wide diversity of plant foods)

- American Gut Project – The Worlds Largest Study of Gut Bacteria Reports Findings for 11,000 Participants

Plant Diversity

There's been increased interest in the power of plant diversity in recent years. The results from the Jena Biodiversity Experiment in Germany, for example, have been nothing short of stunning. The Jena folks put together a great little video, only 8.55 mins .... definitely worth a look!!
https://www.youtube.com/watch?v=j3SvG2nBCTM

In the Jena Experiment, plant diversity increased microbial diversity, resulting in increased soil carbon, which in turn improved soil health, increased productivity, enhanced the availability of nitrogen and phosphorus (and a whole heap of other plant nutrients) and improved soil water-holding capacity. The beneficial effects were additive - even up to 60 species in a mix. That is, every single kind of plant counts - the more species you put together the better it gets.

The Jena experiment demonstrated that diverse plant mixes survive waterlogging far better than monocultures and are also more drought tolerant. In other words, diverse plant communities support a soil microbiome that has higher resilience and greater stress tolerance than the microbiome associated with monocultures.

The sorts of plants used in the mix don't all have to be what you might consider high biomass. The research shows some sub-dominant species (such as linseed/flax) punch well above their weight in terms of stimulating the soil microbiome.
Livestock won’t scour on a good quality multi-species forage. Further, if you include sufficient diversity you will not need to use fertilizer. Indeed, it is better NOT to use a high-analysis fertilizer. Results from around the world show investing in a diverse pasture mix produces higher returns than spending money on other inputs - and also results in improved animal performance (higher growth rates, increased fertility, resistance to internal parasites etc).
Unfortunately increasing the diversity may also increase the cost. If you are unsure of the value of increased diversity, try putting a high diversity mix (say 24 species) down the center of a paddock with a lower diversity mix (say 8 species) either side. Observe where the animals graze and also what happens to the soil under the more diverse mix, color, structure, earthworm numbers etc.

Quorum Sensing

You will find Bonnie Bassler's excellent TED talk on how bacteria communicate here .....

Bonnie Bassler, 'How Bacteria Talk' - *TED Talk on quorum sensing*

The rhizosphere

•Harnessing phytomicrobiome signaling for rhizosphere microbiome engineering **-** *An excellent overview of some of the research into the multiple facets of phytomicrobiome signaling in the rhizosphere, including quorum sensing (QS) and quorum quenching (QQ). The rhizosphere can be 'engineered' using multi-species crops and pastures, biostimulants and appropriate grazing management*

Rhizophagy

Below are links to a couple of articles on rhizophagy (microbivory) ...

This is the easy-to-read version ....

https://www.sciencedaily.com/releases/2018/09/180917111527.htm

A PDF of the original article (not for the faint hearted) can be downloaded from ...
10.3390/microorganisms6030095

John Kempf recently recorded an interview with James White... (recommend listening to this before watching the video)

http://regenerativeagriculturepodcast.com/how-plants-absorb-living-microbes-and-convert-soil-pathogens-into-beneficials-with-james-white

And here's a great YouTube video. Great microscopy!!

https://www.youtube.com/watch?v=qBq_hHJOWy4

Here's one of James White's recent articles ...

https://onlinelibrary.wiley.com/doi/pdf/10.1002/ps.5527

And articles from other authors on a similar theme ....

https://nph.onlinelibrary.wiley.com/doi/pdf/10.1111/nph.13312

https://www.frontiersin.org/articles/10.3389/fpls.2018.00024/full

The micro-centric view explains why the five soil health principles are so important - they all lead to better conditions for soil microbes.

I have no doubt that providing better conditions for microbes (so they can get on with it and do what microbes do best) is the future for ag .....

Applying biostimulants to seeds

Below is a link to a short video on the inexpensive method **Ian and Dianne Haggerty** use for applying biostimulant to seed prior to planting.

https://www.youtube.com/watch?v=l_QGZ-zvY7I
Note that this video was filmed 10 years ago. When Ian mentioned ‘compost tea’ he was referring to a complicated brewed product with which they had ongoing issues. It was difficult to make and difficult to apply. Ian and Dianne now use vermiliquid and compost extract in place of compost tea.

Measuring Brix (using a refractometer)

In addition to resulting in less than optimal animal production, low Brix can lead to a multitude of issues, including vulnerability to pests and diseases.

Here's American entomologist Tom Dykstra's take on Brix ....

https://www.ecofarmingdaily.com/grow-crops/picky-eater-insects-pass-on-high-brix-plants/
The main thing with using a refractometer is to be consistent in your measurements (same part of the plant, same time of day). If you keep good records you will start to see patterns and trends.

Grazing Management

Here's a great Jim Gerrish video on grazing (only 15 mins).

https://www.youtube.com/watch?v=7X_Bz91zWOw

The main take-home message from the above is that you'll get 60% more production in a growing season by only taking half (or less) of the green leaf at each graze. If you graze plants into the ground you lose future production as plants need to use root energy to regrow their tops and that takes time.

From an animal production perspective its important to note that most of the energy, protein and nutrients are in the most recently emerged leaves, hence animal liveweight gains and fertility are higher if only the top half of the plant is grazed. If you watch animals when they first come into a new paddock they move along quickly, skimming the top half off the plants. They're not silly.

For those wanting to delve further into the role of secondary plant compounds (found in biochemically rich, high Brix plants) for both human and livestock health, I would recommend Professor Fred Provenza's recent book 'Nourishment'

Fred Provenza: Nourishment. Reflections on feeding body and spirit in a world of change

https://www.amazon.com/Nourishment-Animals-Rediscovering-Nutritional-Wisdom/dp/1603588027
Please let me know if there are other articles I can assist with.

Warm regards
Christine
Attachments area
Preview YouTube video Jena Experiment Intro english

Preview YouTube video A&L Soil Health Symposium Series Sept 2019 - Dr. James White

Preview YouTube video Innoculation with Nutrisoil

Preview YouTube video Wasting grass