BIOCHAR GUIDE

AGRICULTURE

A sustainable guide to using biochar in agriculture: improving soil, sequestering CO2, increasing yields.

CONTENT

INTRODUCTION

Biochar, also known as plant carbon, offers agriculture an innovative way to improve soils and increase yields while making an important contribution to climate protection. This versatile material is produced through thermal conversion of organic biomass and can be used sustainably in both crop production and livestock farming.

In this guide, you will learn how biochar works, what advantages it offers, and how it is used in practice. Discover how biochar not only promotes soil fertility, but also stores water, binds nutrients, and permanently fixes CO2 in the soil. Together, we can create more sustainable agriculture—for a greener and healthier future.

INTRODUCTION

THE CONVORIS GROUP

THE CONVORIS GROUP IS YOUR EXPERT FOR BIOCHAR: FROM HIGH-QUALITY FEED CHARCOAL TO INDUSTRIAL APPLICATIONS AND CO2 CERTIFICATE TRADING, WE OFFER TAILOR-MADE SOLUTIONS FOR YOUR PROJECTS.

RENE NITSCHE
EXECUTIVE DIRECTOR

Our managing director, René Nitsche, brings many years of experience as an entrepreneur and visionary ideas to the management of the Convoris Group. With his passion for innovative solutions in the field of biochar and climate protection, he drives the development of sustainable technologies and drives our contribution to CO2 reduction and the transition toward a sustainable circular economy

OUR PRODUCTION SITE

Our production site in Reuden is the center of our sustainable value creation: Here, we produce high-quality biochar from natural raw materials and use innovative technologies to create the basis for generating CO2 certificates that actively contribute to climate neutrality.

What makes our biochar so special? Before we answer this question, we will first give you an overview of what biochar actually is on the following pages.

THE POWER OF PORES

ITS GREATEST STRENGTH

Biochar: A natural aid for soils and the environment

The special porosity of biochar makes it a real all-rounder for sustainable agriculture and environmental protection. Thanks to its fine-pored network of micro-, meso- and macropores, it provides several benefits, including improved animal welfare, enhanced soil quality, and greater water retention, and actively contribute to climate protection. This porosity also ensures that biochar acts as an excellent storage medium for nutrients and water. This makes it a natural fertilizer that increases soil fertility in the long term and reduces the need for chemical pesticides. At the same time, it helps to increase the water storage capacity of the soil, making agriculture more resistant to periods of drought. In addition, biochar binds CO2 and thus actively contributes to the reduction of greenhouse gases. Its use not only promotes sustainable and resource-efficient agriculture, but also supports the restoration of ecosystems and the promotion of biodiversity.

CO2 and methane reduction through the use of biochar

In view of the devastating effects of climate change, reducing greenhouse gases has become a high priority. The use of biochar offers an innovative and effective way to significantly reduce both CO2 and methane emissions in various industries. Biochar not only promotes a sustainable circular economy, but also enables companies to actively contribute to climate protection. Reduce your ecological footprint with biochar!

UNLEASHING THE FULL POTENTIAL

Cascade of uses

01. Feed charcoal

Feed charcoal is added to feed, binds bacteria and harmful substances in the digestive tract, and thus promotes the health and well-being of animals. It strengthens the immune system and helps reduce digestive problems. It can also have a positive effect on milk or meat quality by optimizing metabolic processes. This makes it particularly valuable for the production of high-quality animal products.

02. Biochar bedding additive

After natural excretion, the feed charcoal acts as bedding charcoal and binds moisture, reduces odors, and contributes to the prevention of hoof diseases and other health problems through improved stable hygiene. In addition, the porous structure of the bedding charcoal promotes a longer shelf life of the bedding material, which reduces labor and costs.

03. Biochar-amended Slurry

In the final step, the slurry charcoal absorbs nutrients from the slurry and serves as a valuable fertilizer for the fields. At the same time, it reduces odor pollution and promotes more environmentally friendly agriculture. Its high porosity improves soil structure, which increases the soil‘s water storage capacity. This leads to healthier plants and supports a sustainable increase in yield.

04. Field Application

The suspension of manure and biochar is then worked into the soil close to the roots. This sustainably increases soil fertility, while the biochar acts as a carbon sink. This not only supports plant health, but also contributes to climate protection.

BENEFITS OF BIOCHAR

ANIMAL WELFARE

PROMOTING ANIMAL WELFARE WITH BIOCHAR: NATURAL SUPPORT FOR HEALTHY AND HAPPY ANIMALS

Biochar makes a valuable contribution to sustainable and animal-friendly farming practices. Its unique properties support animal welfare in a variety of ways—from improving barn hygiene to promoting animal health and well-being.

Improved stable hygiene

Biochar effectively binds moisture and odors, resulting in a drier and less odorous barn environment. This not only benefits the animals, but also makes everyday work easier for livestock farmers. A pleasant barn climate reduces stress for the animals and minimizes the spread of disease.

Health promotion

In practice, adding biochar to animal feed has shown strong benefits. It aids digestion, reduces harmful substances in the gastrointestinal tract, and can help prevent diarrhea and other digestive problems. Biochar also helps stabilize the intestinal flora, which strengthens the animals‘ immune system. Harmful contaminants in feed, such as aflatoxins, can also be reduced by up to 74%.

Reduction of stress and disease

A better barn climate and optimized feeding have been proven to reduce stress in animals. This positively affects animal behavior and can improve production outcomes and reduces susceptibility to disease. Healthy animals feel good, grow better, and perform optimally—whether in milk, meat, or egg production.

Natural and sustainable

Biochar is a purely natural product that contains no chemical additives. Its use protects the environment and provides animals with safe and sustainable support.

A plus for pet owners and the environment

Biochar not only contributes to promoting animal welfare, but is also a valuable aid for livestock farmers. Fewer cases of disease mean lower treatment costs and less effort. At the same time, biochar supports environmentally friendly animal husbandry by binding nutrients and reducing the carbon footprint.

Note

Each animal species has individual needs, and feeding with biochar offers a wide range of benefits for the health and well-being of animals. Below is an overview of the specific benefits that biochar can bring to your pigs, cattle, and turkeys.

The listed advantages of biochar as feed charcoal show only part of its positive effect on animal welfare. Depending on the animal species and husbandry conditions, the benefits can vary.

Advantages at a glance

- Lowers mortality rates
- Reduces stress and improves animal well-being
- Supports gut health and boosts immune system
- Improves feed intake and digestion efficiency
- Improved gut health
- Lowers risk of hoof diseases
- Minimizes fungal contamination in feed
- Accelerates healthy weight gain
- Enhances feed efficiency for higher gains

Poultry

Health

- Decrease in mortality
- Reduction of stress factors in animals
- Strengthening of the immune system
- Improvement in food intake and utilization
- Reduction in hoof diseases
- Fewer intestinal diseases, fewer cases of diarrhea
- Reduction in fungal contamination in feed and thus fewer diseases in animals
- Improvement in stable hygiene and odor pollution

Efficiency

- Increased feed efficiency with better weight gain
- Higher milk yields through stress reduction
- Improved meat quality

Costs

- Reduction in veterinary costs
- Lower methane emissions (cost savings on CO2 taxes)
- Improved barn hygiene (reduced need for expensive ventilation systems)
- Improved manure management (reduced need for additional fertilizer)
- Possible subsidies and support programs

Studies have been pointing to the beneficial properties of feed charcoal for many years:

- Feeding 2% biochar resulted in significant improvements in body weight, feed intake, and feed efficiency. – Bakr 2007

- Mycotoxins often cause severe liver damage in poultry. Studies show that daily administration of 0.02% biochar relative to body weight can significantly increase the activity of important liver enzymes. While aflatoxin (10 ppm) reduced feed intake and weight gain in broiler chickens, the addition of 0.1% biochar reversed this negative trend. Compared to a conventionally used aluminum silicate product, it was found that the combination of 0.25% to 0.5% biochar significantly reduced liver and blood levels of aflatoxin B. – Dalvi & McGowan, 1984 and Kubena et al., 1990; Denli & Okan, 2007

- ...The effects of biochar in storing moisture and nutrients also lead to better microbiological degradation of poultry manure. Carbon and nitrogen losses are significantly reduced, which also reduces greenhouse gas emissions. – Steiner 2010

Reduced veterinary costs
-AHP, U. Arnold, D. Leetsch, March 2023

Up to 50 % with feed charcoal, Ø US$ 4.12

No saving without feed charcoal, Ø US$ 8.25

Body weight
-K. W. mcCafferty and J. L. Purswell 2023

Ø 14.5% higher weaning weight

Ø 7.4% higher Feed Intake

Collagen content in eggs from laying hens
- Yamauchi et al., 2013

Up to 33% per egg

Improved feed conversion ratio (FCR)
- Prasai et al. (2016)

Up to 12% feed savings

Pigs

Health

- Decrease in mortality
- Reduction of stress factors
- Strengthening of the immune system
- Improvement of health in piglet rearing
- Improvement of feed intake and utilization
- Increase in the activity of important liver enzymes
- Reduction of mycotoxins and aflatoxin concentration Reduction of hoof diseases
- Fewer intestinal diseases, fewer cases of diarrhea
- Improvement of stable hygiene and odor pollution
- Binding of ammonia in the stable

Efficiency

- Increased feed efficiency with better weight gain
- Improved meat quality
- Longer service life of barn bedding

Costs

- Reduction in veterinary costs
- Reduction in feed costs
- Longer animal productivity
- Reduction in methane emissions (cost savings on CO2 taxes)
- Improved barn hygiene (reduction in the need for expensive ventilation systems)
- Reduction in bedding costs (carbon binds moisture and makes bedding usable for longer)

Studies have been pointing to the beneficial properties of feed charcoal for many years:

- Several studies on the use of bamboo biochar in pigs show that a supplement of 0.3% biochar increased weight gain by 17.5%. Higher doses did not result in significant differences. Biochar improved meat quality and fatty acid composition and, in some studies, maintained the growth rate otherwise achieved with antibiotics. – Chu et al. 2013c

- Biochar increased growth and feed efficiency while reducing harmful gas emissions and fecal microflora in fattening pigs. In addition, biochar can protect pigs from infection and reduce stress due to decreased cortisol concentration and increased IgG concentration in serum or blood cells in fattening pigs. Biochar is expected to improve pig production due to the improved gastrointestinal environment of fattening pigs. – Chu, G. M., Kim, J. H., Kim, H. Y., Ha, J. H., Jung, M. S., Song, Y., ... Song, Y. M. (2013)

- An experiment with 420 pigs showed that 30 g of biochar plus 30 g of stevia per kg of feed improved daily weight gain, feed efficiency, and meat quality. – Lee et al., 2011; Choi et al., 2012)

Reduced veterinary costs
-AHP, U. Arnold, D. Leetsch, March 2023

Up to 50 % with feed charcoal, Ø US$ 75.16

No saving without feed charcoal, Ø US$ 150.31

Improvement of immunoglobulin levels
-G.M. Chu et al.

Immunglobulin M by 9%

Immunglobulin G by 10.5%

Feed conversion ratio
-AHP, U. Arnold, D. Leetsch, March 2023

up to +20,6%

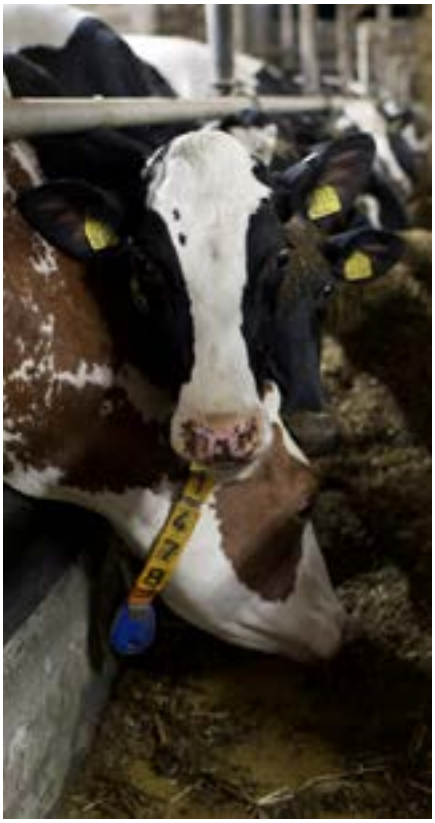
Weight gain
- Chu et al. 2013c

Up to +17,5% per animal

Cattle

Health

- Decrease in mortality
- Reduction of stress factors in animals
- Strengthening of the immune system
- Improvement in feed intake and utilization
- Reduction of aflatoxin concentration in feed by up to 74% and in milk by up to 45%
- Reduction in hoof diseases
- Fewer intestinal diseases, fewer cases of diarrhea
- Reduction in fungal contamination in feed and thus fewer diseases in animals
- Improvement in stable hygiene and odor pollution



Efficiency

- Increased feed efficiency with better weight gain
- Higher milk yields through stress reduction
- Improved meat quality

Costs

- Reduction in veterinary costs
- Lower methane emissions (cost savings on CO2 taxes)
- Improved barn hygiene (reduced need for expensive ventilation systems)
- Improved manure management (reduced need for additional fertilizer)

Studies have been pointing to the beneficial properties of feed charcoal for many years:

- Biochar reduces aflatoxin concentrations in feed by up to 74% and in milk by up to 45%. In some situations, the addition of biochar to feed led to a significant reduction in mycotoxins such as ochratoxin A and deoxynivalenol. – Galvano et al. (1996a) and Diaz et al., 2004

- Veterinarian Achim Gerlach fed 100 to 400g of biochar per cow daily without any negative side effects. The somatic cell count in milk decreased, while the milk protein and fat content decreased. After discontinuing the addition of biochar, the cell counts rose again and the animals‘ performance declined. – Gerlach et al. (2014)

- In the case of fungus-contaminated silage feed, feed intake and digestibility were improved and the fat content in the milk was increased. – Bueno et al. (2005)

- In a study, four cattle were fed with or without 0.6% biochar (based on dry matter) for 98 days. The biochar feed resulted in a 25% higher weight gain compared to the control animals. -Leng et al. (2013b)

Reduced veterinary costs
-AHP, U. Arnold, D. Leetsch, March 2023

Up to 50 % with feed charcoal, Ø US$ 30.93

No saving without feed charcoal, Ø US$ 61.78

Reduction of aflatoxins
-Galvano et al. (1996a) and Diaz et al., 2004

74% in the feed

45% in the Milk

Increase in daily milk yield
-AHP, U. Arnold, D. Leetsch, March 2023

Up to 11%

Weight gain after 98 days
- Leng, Preston & Inthapanya, 2013

Up to 25% per animal

PRACTICAL EXAMPLES

CASE STUDIES

Experiment description: Pig fattening 2023*:

- Use of 2 m^3 feed charcoal for fattening 480 pigs.
- Feed charcoal was added via the liquid phase of the feed.
- Reference group without feed charcoal: 450 pigs.
- Use over 120 days, including 80 days with charcoal = 52 ml per day and animal or 5.2 g.
- Cost per day at VK US$ 707.87 per m^3 = US$ 0.0348 per day and animal

Evaluation

- Average additional weight per animal: 3 kg (480 animals)
- Additional revenue for 480 animals = 1,440 kg additional weight
- Average selling price US$ 2,32 per kg producer price
- Additional revenue for 1,440 kg = US$ 3,334.08
- Cost of feed charcoal US$ 1,390.20
- Cost per animal for feed charcoal for entire fattening cycle = US$ 2,94

Cost per animal	$ 2,94
Additional revenue per animal	$ 6.95
Profit per animal	**$ 4,01**

Cost for 480 animals	**$ 1,414.27**
Additional revenue 480 animals	**$ 3,334.68**
Profit 480 animals	**$ 1,923.81**

Other observed effects:

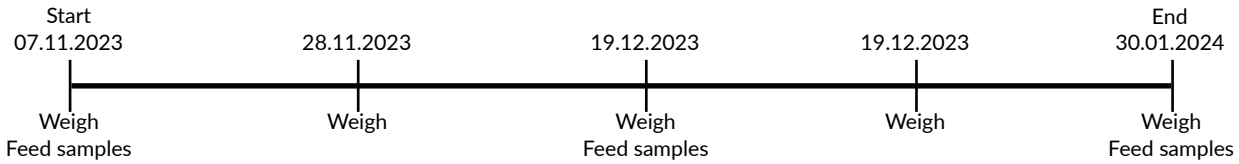
- Better stable hygiene
- Less diarrhea
- No cannibalism (tail biting)
- Less need for medication (not quantified)
- Use of manure charcoal on fields with higher yields

*diese Daten wurden jeweils in Kooperation zwischen landwirtschaftlichen Betrieben und der BioChar durch die Anwendung der Biochar in der Praxis ermittelt.

Experiment description: Bull breeding 2023/2024:

The test animals consisted of a herd of 60 animals, including 24 bulls and 36 heifers. They were divided into four groups: two groups of 12 bulls each and two groups of 18 heifers each. One group was fed 2% biochar in their concentrated feed, while the other two groups served as controls. The bulls were born between October 17, 2022, and January 28, 2023. The heifers were born between November 7, 2022, and January 1, 2023. The breeds are very heterogeneous due to various crossbreeding. The concentrated feed was administered via a feeding table. The concentrated feed was sprinkled on the feed after the roughage had been given. Concentrated feed intake is recorded in groups. The two bull groups received three buckets (14.1 kg each) of concentrated feed twice a day. The heifer groups received two buckets (14.1 kg each) of concentrated feed twice a day. This results in a theoretical concentrate intake of 7.05 kg animal/d for the bulls and 3.13 kg animal/d for the heifers. The product data sheet shows that the coal has a carbon content of over 91% and a water content of less than 5%.

Timeline illustrating the test procedure



Bull	ø-weight kg 07.11.2023	ø-weight kg 28.11.2023	**Difference kg**	ø-weight kg 09.01.2024	Difference kg
Without biochar	229,9	238,3	**8,4**	261,5	31,6
With biochar	205,3	218,8	**13,5**	238,0	**32,7**
Difference kg	21,7	19,5	**5,1**	23,5	1,1

Färse	ø-weight kg 07.11.2023	ø-weight kg 28.11.2023	**Difference kg**	ø-weight kg 09.01.2024	**Difference kg**
Without biochar	167,2	174,3	**7,1**	191,9	**24,7**
With biochar	177,6	186,7	**9,1**	206,2	**28,6**
Difference kg	10,4	12,4	**2,0**	14,3	**3,9**

DID YOU KNOW?

QS-CERTIFICATION

We are one of the few companies in Germany to be QS-certified!

What does QS certification mean?
QS stands for "Quality and Safety" and is a recognized system that ensures particularly high standards in the food industry in Germany. It covers all areas from raw materials and processing to delivery and sale of products. Companies that carry this certificate have provided comprehensive evidence that they meet the highest quality requirements at every step of their production.

Why is QS certification important?
QS certification is much more than just proof of our high standards. It is a promise to our customers that every product that leaves our company is safe, high-quality, and reliable. It ensures transparency, traceability, and trust—at every stage of production.

- **Safety**: We rely on comprehensive monitoring and control of all production processes to ensure that all legal requirements and safety standards are met.
- **Sustainability**: Our QS certification ensures that we take responsibility for the environment and apply sustainable practices in our production.
- **Trust**: For our customers, QS certification guarantees that they always receive a product of the highest quality that is safe to consume.

How is QS certification verified?
In order to obtain and maintain QS certification, our company undergoes regular, rigorous audits. These include:

- **Regular audits:** Independent testing organizations conduct detailed inspections to ensure that all quality and safety standards are met.
- **Documentation and traceability:** All production steps are documented to ensure complete traceability of our products.
- **Process optimization:** Measures are continuously taken to optimize our processes and further improve quality.

Our contribution to food safety
At a time when consumers are paying more and more attention to safety and quality, our QS certification sends a clear message: we are committed to the highest quality standards. In this way, we not only contribute to improving food safety, but also to creating a relationship of trust with our partners and customers.

Zertifikat D12 / SGS0510789 QS

Zertifikat

Durch ein Audit am 12. Oktober 2023, dokumentiert in einem Bericht, bestätigt die

Zertifizierungsstelle Meat and Food der SGS Germany GmbH
49685 Emstek, Europa-Allee 12

dem Unternehmen
Biochar GmbH & Co.KG
Sudetenstr. 8
36129 Gersfeld
QS-ID: 4953113265953

am Standort
Biochar GmbH & Co.KG
Ziegeleistraße 1
06729 Elsteraue
Standortnummer: F00016138

die Einhaltung der Anforderungen des QS Systems für
Fleisch und Fleischwaren

auf der Stufe
Futtermittelwirtschaft

Produktionsart
Einzelfuttermittelherstellung
(Gruppe 7: Andere Pflanzen, Algen und daraus gewonnene Erzeugnisse und Nebenerzeugnisse)

Zertifizierungsentscheidung: 18. Oktober 2023
Zertifikat gültig bis: 12. Oktober 2025

erstellt am 25. Oktober 2023

Dipl.-Ing. agr. Heidrun Klockgether
Stellv. Leiterin der Zertifizierungsstelle
SGS Germany GmbH
Europa Allee 12 D-49685 Emstek
t +49 4473 9439 – 0 f +49 4473 9439 – 48 www.sgs.com

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-11020-01-00

QS. Ihr Prüfsystem für Lebensmittel.

Dieses Zertifikat ist Eigentum der Zertifizierungsstelle und muss auf Verlangen zurückgegeben werden. Maßgeblich für die Lieferberechtigung zugelassener Standorte sind allein die Angaben in der Software-Plattform, da Abweichungen infolge von Vertragsdetails, Sperrung o.ä. vorliegen können.

Prüfgrundlage ist das QS-Systemhandbuch in der jeweils zum Zeitpunkt des Audits gültigen Fassung.

ADVANTAGES OF BIOCHAR

SOIL IMPROVEMENT

BIOCHAR AS A SOIL CONDITIONER: A SUSTAINABLE APPROACH TO FERTILE SOILS

Biochar is a true all-rounder when it comes to improving soils in the long term while also contributing to environmental protection. Its special properties make it an ideal solution for challenges in agriculture, horticulture, and land greening. At the heart of its effectiveness are its unique porous structure and its ability to efficiently store and regulate water, nutrients, and microorganisms.

How biochar improves the soil

The use of biochar as a soil conditioner offers numerous advantages that sustainably improve both soil structure and soil fertility:

1. Water regulation and storage

The highly porous structure of biochar acts like a sponge, absorbing water and slowly releasing it into the soil. This reduces the risk of waterlogging while keeping the soil moist for longer – a decisive advantage, especially in regions with irregular or low rainfall. Improved water availability allows plants to grow healthier and better withstand drought stress.

2. Improved nutrient storage

Thanks to its pores, biochar provides an ideal reservoir for nutrients. These are stored and slowly released to the plants as needed. At the same time, biochar prevents nutrients from leaching into the groundwater, which not only optimizes plant nutrition but also makes an important contribution to environmental protection.

3. Habitat for microorganisms

The fine pores of biochar provide a protected habitat for beneficial microorganisms that are essential for healthy soil biology. These microbes play a central role in converting organic material into plant-available nutrients and contribute to long-term soil fertility.

4. Improving soil structure

Thanks to its stable structure, biochar loosens compacted soils and improves aeration and root penetration. This promotes healthy root growth and ensures that nutrients and water are distributed evenly.

5. Climate protection through carbon storage

Biochar stores carbon in a stable form and binds it in the soil for the long term. This helps to reduce the CO2 content in the atmosphere and thus combat climate change. Biochar also reduces the release of greenhouse gases such as methane and nitrous oxide from the soil.

Note

When using biochar, the results can depend on a variety of factors. These include, for example, the pH value of the soil, the type of carbon inoculation, or the soil conditions. To achieve optimal results, it is important to take the specific conditions on site into account and adapt the application accordingly.

Advantages at a glance

- Significantly reduces manure odor
- Boosts the fertilizing effect of manure
- Improves soil structure
- Helps prevent soil erosion
- Promotes microbial activity and soil biodiversity
- Helps regulate and stabilize soil pH
- Improves long-term nutrient availability
- Increases cation exchange capacity
- Enhances yield potential by supporting nutrient retention
- Improves water storage capacity in soil
- Reduces groundwater contamination
- Enables long-term carbon storage
- Reduces nitrogen losses into the soil

PRACTICAL EXAMPLES

EXPERIENCE REPORTS

Description of the 2023 corn harvest experiment*:

- Biochar must be added to the slurry tank for 3-4 weeks to activate it
- 2.5 m^3 of charcoal mixed into 500 m^3 of slurry
- Slurry containing biochar was added to two layers of the soil (approx. 15 and 30 cm)
- Row spacing for subsequent corn planting: 0.75 m
- 35 m^3/ha manure application using the strip-till method

Root ball without biochar Root ball with BioChar biochar

2023 corn harvest results:

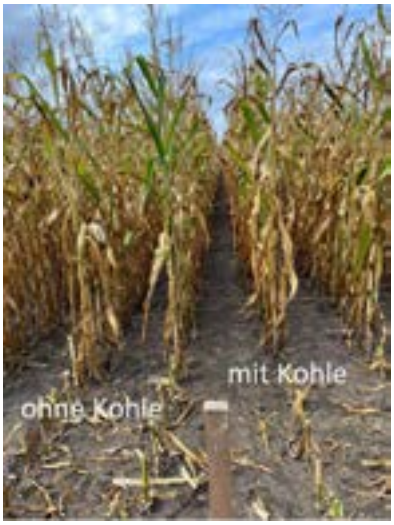
- 04.07.2022: The corn plant WITHOUT biochar is 5-8 cm shorter than the corn plant WITH biochar.
- 13.07.2022: The corn plant WITHOUT biochar is 10-20 cm shorter than the corn plant WITH biochar (height approx. 2.25 m).
- 19.07.2022: The corn plant WITHOUT biochar is 22 cm shorter than the corn plant WITH biochar (height approx. 2.4 m).
- 19.07.2022: The corn plant WITHOUT biochar is 40 cm shorter than the corn plant WITH biochar. The root system of the plant with biochar is stronger.
- 14.09.2022: The cob of the corn plant WITH biochar is fully developed, while the one WI THOUT biochar is only 2/3 developed. The length of the corn plants is almost the same, but the corn plant WITH biochar is more stable and stronger.
- 26.09.2022: The corn plant with charcoal has partially formed two cobs, while the corn plant without charcoal has only formed one.

Assumption: The strip-till method ensures that the nutrients in the manure reach the root area directly. In combination with the manure charcoal, the nutrients were better available to the plant in the long term. In addition, the manure charcoal ensured a longer supply of moisture during the low-precipitation period, which was beneficial for the growth of the corn plant.

*This data was determined in cooperation between agricultural businesses and BioChar through the practical application of BioChar.

Root ball with BioChar biochar

Root ball without biochar



<-Without Biochar ; With Biochar->

		Difference		Profit from coal per ha
„Bullinga“ corn without biochar „Bullinga“ corn with biochar	3860 kg 4760 kg	+900 kg	→	1 180,91 $
„Around“ corn without biochar „Around“ corn with biochar	4240 kg 4660 kg	+220 kg	→	386,11 $
„Bismark“ corn without biochar „Bismark“ corn with biochar	5380 kg 5520 kg	+140 kg	→	451,73 $
„Feuerstein“ corn without biochar „Feuerstein“ corn with biochar	4860 kg 5020 kg	+160 kg	→	329,07 $

GALLERY

Control group without biochar

Tomatoes, 05.2024

	Control	Biochar
Height	41 cm	82 cm
Width	18 cm	62 cm
Length	35 cm	50 cm
Blos-soms	22 pcs.	54 pcs.
Fruits	12 pcs.	34 pcs.

Treated (inoculated) with biochar

Control group without biochar

Almond tree plantations 04.2023 - 06.2024

The leaves of the treated plants are not only four times as large as those of untreated trees, but they are also darker in color, indicating higher chlorophyll content.

Treated (inoculated) with biochar

Control group without biochar

Milkweed, spring 2024

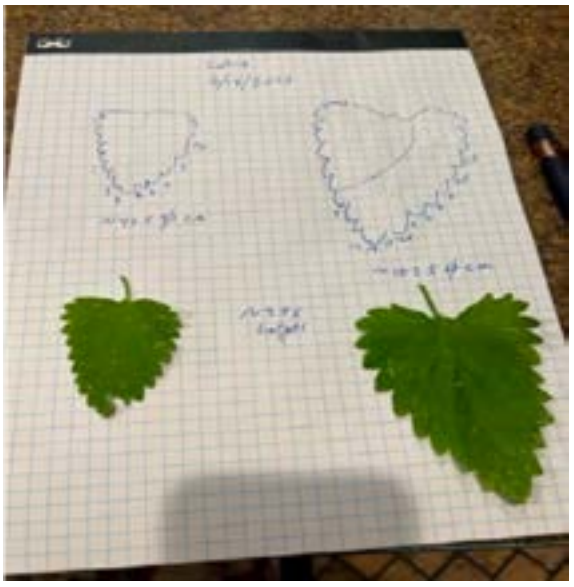
The treated plant grew 76 times larger than the control.

Treated (inoculated) with biochar

Comparison group without biochar

Control group with biochar (inoculated)

Comparison group without biochar



Control group with biochar (inoculated)

Comparison group without biochar

Treated (inoculated) with biochar

WE AS A PRODUCER

WHAT DEFINES US

BIOCHAR IS OUR FOCUS —FOR A GOOD REASON

We use a sophisticated pyrolysis process in which organic residues are processed at extremely high temperatures of over 700 to 1200 °C in an oxygen-reduced atmosphere. This process produces biochar of the highest purity and with unique porosity. The result is a stable carbon that retains its effectiveness for centuries. While the process may seem straightforward, it requires prices technical control to ensure the exceptional properties of our biocharr.

We are one of the few German companies to be a QS-certified feed manufacturer, and we are proud of this. This certification demonstrates the high quality and safety of our products and reinforces our commitment to elite production standards. We select our raw materials with the utmost care and use only certified A1 grade wood for our feed charcoal. In addition, we continuously optimize our production processes and regularly subject our products to external laboratory analyses to ensure and further improve quality. It is particularly noteworthy that we produce biochar with a water content of < 3%, which makes it an even more efficient solution and means that problems such as mold growth in feed are a thing of the past.

For us, sustainability is not just a buzzword, but a fundamental principle. For us, production means more than just manufacturing a product—it means responsibility. Responsibility toward nature and future generations. That is why we are continuously working to further develop our technologies and applications so that we can offer increasingly efficient, sustainable, and versatile solutions. This not only keeps us at the cutting edge of technology, but also allows us to set new standards in the biochar industry.

We are convinced that biochar is a key product for a more sustainable future. That is why we are passionate about helping to shape the world of tomorrow through innovative, responsible production today.

Quality from a single source

Sustainability, innovation, and the highest quality—that's what BioChar stands for. As a leading producer of high-quality biochar, we handle the entire production process ourselves:

- **In-house plant engineering** – Existing machines were unable to meet our specific requirements, so we designed and manufactured our own production equipment.
- **Our own timber** – We use exclusively sustainably sourced wood to meet the highest quality and environmental standards.
- **In-house production** – From raw material processing to the finished product, every step is in our hands.
- **In-house quality control** – Strict controls guarantee the consistently high quality of our biochar products.

Why BioChar coal?

- **Mold resistance & long shelf life**
  Thanks to our special manufacturing process, feed containing our biochar stays fresh longer without going moldy—ideal for safe and sustainable feeding.
- **Safe production without water extinguishing**
  Unlike conventional methods, our patented technology does not require water for quenching, allowing us to produce pure and dry biochar without the risk of hotspots.
- **Maximum adsorption capacity for best results**
  Our biochar is characterized by a particularly high adsorption capacity. This not only increases its effectiveness in soil and feed, but also leads to higher yields and better results.

By maintaining complete control over the entire manufacturing process, we ensure that our biochar meets the highest quality standards and creates real added value for agriculture, animal husbandry, and the environment.

CERTIFICATIONS AND QUALITY STANDARDS

FOR US, QUALITY MEANS COMMITMENT

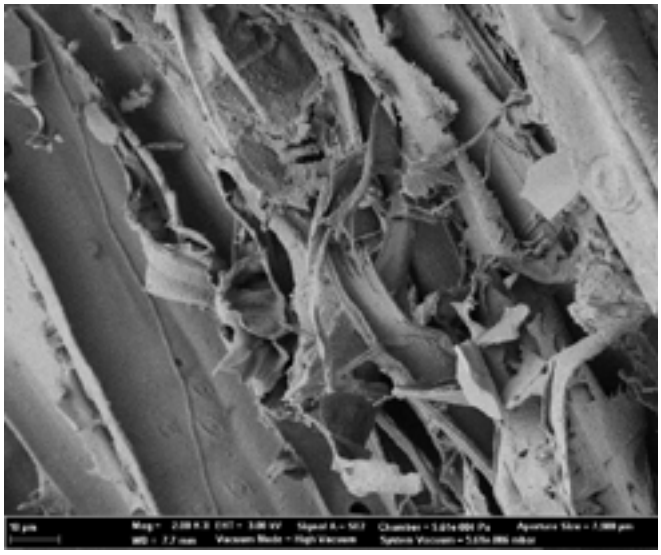
As a company that is consistently committed to quality and safety, we have a number of recognized certifications that demonstrate our high standards of product quality and compliance with strict standards. These certificates are not only a sign of our professional competence, but also a promise to our customers that we guarantee the highest quality standards in all areas of our production.

QS and EBC certification: Highest quality standards in all areas

We are proud to be one of the few companies in Germany to hold both QS and EBC certification. QS certification, the leading quality assurance system in the food industry, ensures that all production processes – from raw materials to the finished product – are subject to strict testing. It stands for transparency, safety, and the highest quality standards, as every step of production is fully documented and traceable. In addition, EBC certification proves our ability to manufacture high-quality products in accordance with the specific requirements of the brewing and food industry. It shows that we use advanced technologies and processes to meet the highest industrial quality standards while complying with environmental regulations. Both certificates underscore our commitment to excellence and continuous improvement in all areas of our production.

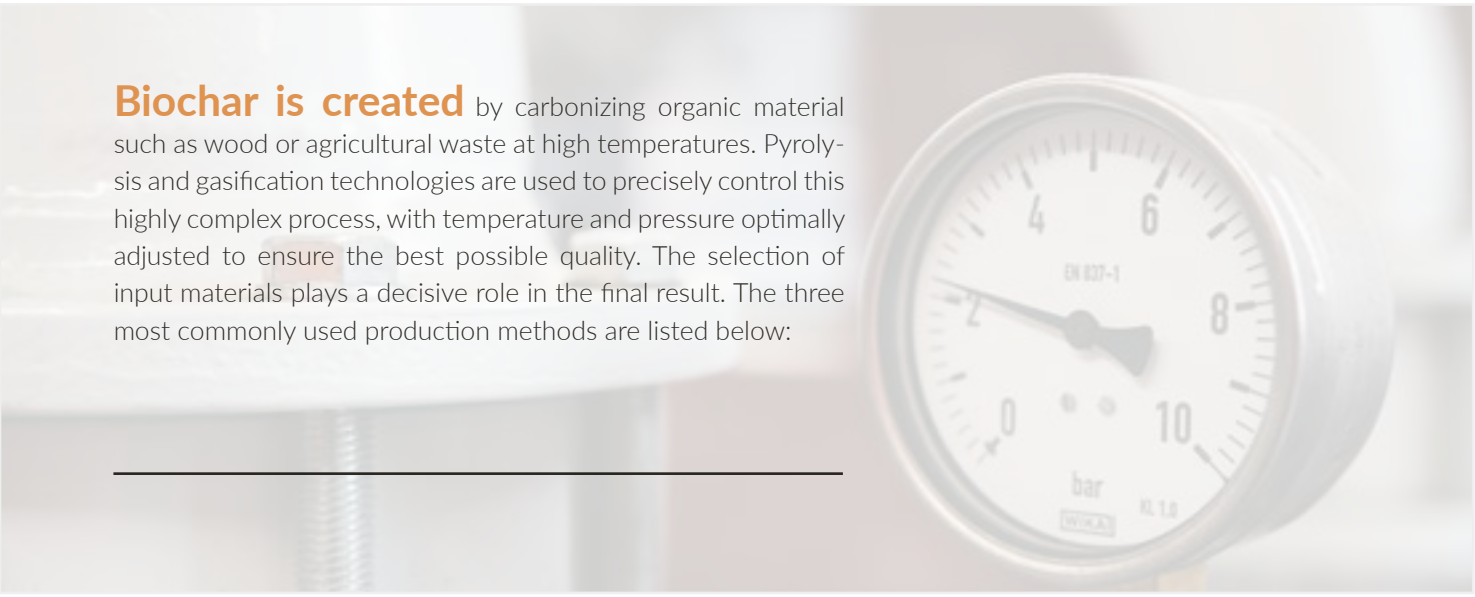
Our own laboratory: precision and control

To ensure the highest product quality, we operate our own state-of-the-art laboratory. This enables us to continuously monitor all our products and processes and optimize them in real time. Using the latest technology and qualified specialists, we carry out comprehensive tests to ensure that all quality standards are met. The laboratory helps us to guarantee both the safety and performance of our products.



HOW IS BIOCHAR PRODUCED?

Biochar is not new. Thousands of years ago, indigenous peoples in the Amazon region used similar techniques to make their soil more fertile. Today, we are reviving this ancient idea, but with modern knowledge and technology. This ensures that the positive effects of biochar remain consistent and without any loss of quality.



Biochar is created by carbonizing organic material such as wood or agricultural waste at high temperatures. Pyrolysis and gasification technologies are used to precisely control this highly complex process, with temperature and pressure optimally adjusted to ensure the best possible quality. The selection of input materials plays a decisive role in the final result. The three most commonly used production methods are listed below:

01

HTC (hydrothermal carbonization)

This method is gaining relevance, especially for processing wet biomass, which is difficult to handle in other processes. It enables the conversion of organic materials with high water content, such as agricultural waste, sewage sludge, or algae, into a carbon-rich solid.

In HTC, biomass is processed in an aqueous solution under high pressure and temperatures of 180 to 250 °C. This causes chemical reactions such as hydrolysis and decarboxylation to take place, leading to the formation of HTC charcoal.

The process is efficient and resource-saving, as no energy-intensive drying is required. In addition, the resulting liquid and gas products can be further recycled. HTC thus offers a sustainable method that is particularly suitable for residues with a high water content.

02

Pyrolysis process

The most widely used method for producing biochar is pyrolysis, in which biomass is heated without oxygen at temperatures between 350 and 900 °C. This leads to the thermal decomposition of organic materials and produces biochar, pyrolysis gases, and liquid products such as tar and acetic acid.

Pyrolysis is divided into slow and fast pyrolysis. Slow pyrolysis, which is more commonly used, produces more biochar because the biomass is heated for longer at moderate temperatures, while gas and liquid production is lower. Fast pyrolysis, on the other hand, produces more liquid products such as bio-oil with shorter residence times and higher heating rates, making it attractive for liquid fuels.

Another crucial factor in pyrolysis is process control. Parameters such as heating rate, residence time, and final temperature significantly influence the properties of the biochar produced, including its carbon content, porosity, and chemical composition.

03

Gasification

During gasification, biomass is processed at high temperatures between 700 and 1,000 °C in a limited oxygen environment or with the addition of a reaction gas such as steam. This mainly produces synthesis gases, also known as syngas, which consist of carbon monoxide, hydrogen, and methane. These gases can be used for energy production or as chemical feedstocks.

Another product of gasification is biochar, which is produced in small quantities as a residue. Depending on the process control and material composition, this can also be put to good use.

Gasification is mainly used in large industrial plants, as the process offers high efficiency and allows flexible use of the resulting synthesis gases. In addition to direct energy production, the gases can also be used in other applications such as the production of liquid fuels or chemicals.

FREQUENTLY ASKED QUESTIONS AND MYTHS

ANSWERS & CLARIFICATION

Biochar, also known as plant carbon, is a much-discussed topic in the fields of agriculture, climate protection, and soil improvement. Despite its diverse applications and advantages, there are numerous misconceptions about its production, use, and effects. Some of the most common misconceptions are explained and corrected below.

Biochar and charcoal are the same thing.

A common misconception is that biochar is identical to commercially available charcoal. In fact, the two products differ significantly in terms of their production and application. While charcoal is primarily used as a fuel, biochar is specifically produced for soil improvement and carbon storage. Biochar is produced under controlled conditions through pyrolysis, whereby temperatures, oxygen content, and raw materials are controlled in such a way that an optimal structure for soil enrichment is maintained.

Biochar automatically improves every soil

Another misconception is the assumption that biochar is universally beneficial to all soil types without adaptation. In fact, the effect of biochar varies depending on soil type, climate, and agricultural use. In sandy soils, biochar can improve water retention capacity, while in heavy clay soils it promotes aeration. However, biochar should be "inoculated" with compost or nutrients before application to achieve optimal effect and avoid short-term nutrient losses.

Biochar releases CO2 and is harmful to the climate

A common misconception is the assumption that biochar contributes to CO2 emissions and is therefore harmful to the climate. In fact, biochar stores carbon over long periods of time because the carbon from plant material is in a stable form. This contributes to reducing atmospheric CO2 levels, especially when biochar is produced from biomass waste that would otherwise rot and release CO2.

The production of biochar leads to environmental destruction

Some people fear that the production of biochar leads to deforestation and waste of resources. However, this is not the case if sustainable biomass sources are used. Suitable raw materials include agricultural residues, wood waste, and other organic by-products. Sustainably produced biochar therefore does not contribute to deforestation, but offers a sensible use for organic waste materials.

Biochar is a fertilizer

Biochar is often confused with fertilizer. In fact, pure biochar itself contains hardly any significant amounts of nutrients. Its main function is to improve soil structure and store water and nutrients, which can then be better

absorbed by plants. A combination of biochar with organic fertilizers or compost is therefore recommended.

Biochar works immediately and replaces other soil improvements

Another misconception is the idea that biochar has an immediate effect and makes other soil improvement measures unnecessary. In fact, biochar improves soil quality gradually over a longer period of time. It can take several months or years to achieve the full effect. In addition, biochar should be considered as part of a holistic soil management approach and combined with other techniques.

Conclusion

Biochar offers many advantages, but only if it is used properly. It is important to understand the differences between biochar and charcoal, consider their effects on different soil types, and use them in combination with other soil improvement methods. When used correctly, biochar can make an important contribution to climate protection and sustainable agriculture.

At the end: A look into the future

Biochar is more than just a trend—it is a building block for sustainable and resilient agriculture. With this guide, we have shown you how you can use simple means to promote animal welfare, revitalize soils, increase yields, and protect the climate at the same time. Be inspired and become part of a movement that is revolutionizing agriculture—for us and for future generations.

SOURCE DIRECTORY

LIST OF CITED STUDIES

Bakr 2007 :
The Effect of Using Citrus Wood Charcoal in Broiler Rations on the Performance of Broilers.
An-Najah Univerity Journal for Research 22:17-24

Dalvi & McGowan, 1984:
Experimental Induction of Chronic Aflatoxicosis in Chickens by Purified Aflatoxin b1 and Its Reversal by Activated Charcoal, Phenobarbital, and Reduced Glutathione.
Toxicology Letters 16(1–2):153-157

Kubena et al., 1990:
Diminution of Aflatoxicosis in Growing Chickens by the Dietary Addition of a Hydrated, Sodium Calcium Aluminosilicate.
Poultry Science 69(5):727-735

Denli & Okan, 2007:
Efficacy of different adsorbents in reducing the toxic effects of aflatoxin B 1 in broiler diets.
South African Journal of Animal Science 36:222-228

Steiner et al., 2010:
Reducing Nitrogen Loss during Poultry Litter Composting Using Biochar.
Enviroment Quakity 39(4):1236

Chu, G. M., Kim, J. H., Kim, H. Y., Ha, J. H., Jung, M. S., Song, Y., ... Song, Y. M. (2013):
Effects of bamboo charcoal on the growth performance, blood characteristics and noxious gas emission in fattening pigs.
Journal of Applied Animal Research 41(1):48-55

Choi et al., 2012:
Growth Performance, Immune Response and Carcass Characteristics of Finishing Pigs by Feeding Stevia and Charcoal.
Korean Journal for Food Science of Animal Resources 32(2):228-233

Lee et al., 2011:
Meat Quality and Storage Characteristics of Finishing Pigs by Feeding Stevia and Charcoal.
Korean Journal for Food Science of Animal Resources 31(2):296-303

Galvano et al. (1996a):
Activated Carbons: In Vitro Affinity for Aflatoxin B1 and Relation of Adsorption Ability to Physicochemical Parameters.
Journal of Food Protection 59(5):545-550

Diaz et al., 2004:
Aflatoxin Binders II: Reduction of aflatoxin M1 in milk by sequestering agents of cows consuming aflatoxin in feed.
Mycopathologia 157(2):233-241

Gerlach et al. (2014):
Oral Application of Charcoal and Humic acids to Dairy Cows Influences Clostridium botulinum Blood Serum Antibody Level and Glyphosate Excretion in Urine.
Journal of Clinical Toxicology 4(2):186

Bueno et al. (2005):
In Vitro Binding of Zearalenone to Different Adsorbents.
Journal of Food Protection 68(3):613-615

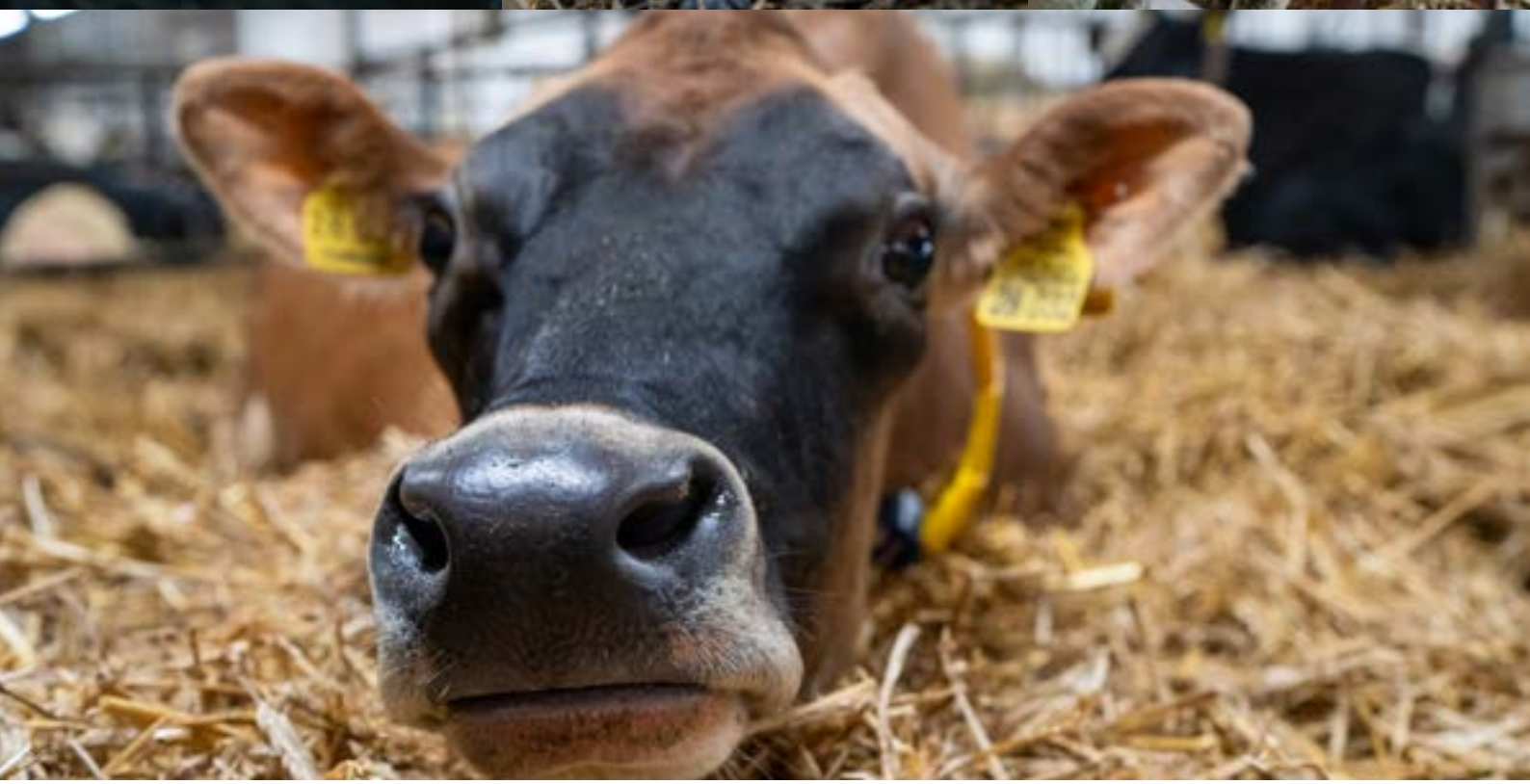
AHP, U. Arnold, D. Leetsch, März 2023:
Bericht zur Wirtschaftlichkeit der Verwendung von Biokohle in der Landwirtschaft.
AHP GmbH & Co. KG im Auftrag der BioCHar GmbH & Co. KG für interne Zwecke

K. W. McCafferty and J. L. Purswell 2023:
Effects of various concentrations of supplemental biochar on ileal digestible energy and live performance of broilers during an 8-wk production period.
Journal of Applied Poultry Research

Yamauchi et al., 2013:
Increased collagen accumulation in eggshell membrane after feeding with dietary wood charcoal powder and vinegar.
Connective Tissue Research 54(6):416-425

Prasai et al., 2016:
Biochar, Bentonite and Zeolite Supplemented Feeding of Layer Chickens Alters Intestinal Microbiota and Reduces Campylobacter Load.
PLOS ONE 11(4):e0154061

Leng, Inthapanya & Preston, 2013:
All biochars are not equal in lowering methane production in in vitro rumen incubations.
Livestock Research for Rural Development 25:106



Administration
Schachener Str. 4a
36129 Gersfeld

Production
Ziegeleistraße 1
06729 Elsteraue