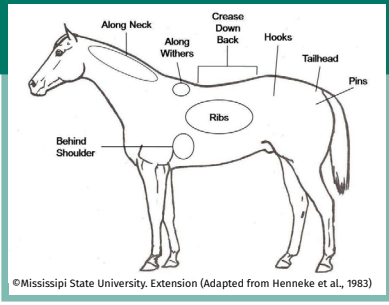
Technical Sheet for Solution Implementation

Maintaining a Healthy Body Condition Score in Breeding Mares



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Thematic Area: Health and Welfare of Equines.

Priority: What practices can be implemented in order to promote biosecurity measures and prevent emergent diseases?

Need: Reproductive performance issues: silent heat, ovarian inactivity, resorption of the embryo, miscarriages... How can I improve reproductive performance on my farm?

Solution EU Number: HE-08.

Content of the Solution: Practical guidance on the assessment and nutritional management of broodmares based on Body Condition Scoring (BCS) to optimize reproductive performance and foal development.

Reasons for Implementing this Solution

To ensure optimal reproductive performance and foal health, it is essential to maintain an adequate body condition score in breeding mares and implement a structured BCS management plan throughout the reproductive cycle.

Description of Solution Strategies

The Body Condition Score (BCS) is a standardized method for assessing the nutritional status of an adult horse by evaluating externally visible and palpable fat deposits across specific body regions. The goal is to objectively quantify body fat, as both under- and overconditioning can negatively impact reproductive performance.

An optimal BCS is essential for fertility and healthy foal development. Both underconditioning and overconditioning can impair:

- Estrous cycle regularity
- Cyclic activity
- Conception rate
- Pregnancy progression
- Foal vitality
- Growth, musculoskeletal status and hormonal balance in foals

It is recommended to assess BCS regularly, especially prior to breeding, before initiating winter lighting programs and during the final third of gestation.

Body Regions Assessed in BCS Evaluation in Horses

Depending on the given protocol, the assessment is performed visually and by palpation at the following anatomical sites:

- Neck
- Wither
- Back
- Behind the shoulder
- horacic wall (ribs)
- Croup and hip (assessed together)
- Tailhead

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The evaluation distinguishes between muscle mass and fat tissue. Each region is scored individually, and the overall BCS is calculated by applying specific weighting coefficients to the scores of the different body regions. Protocols, tools and calculators to support this weighted assessment are available in the resources section of this factsheet.

BCS Scoring Systems

Several scoring systems exist for evaluating the BCS in horses:

- 9-point scale (Henneke et al. 1983)
- 6-point scale (0-5) (Carroll & Huntington, 1988), used in AWIN welfare assessment protocol for horses and Welfare Monitoring System: Assessment protocol for horses.
- 6-point scale (0-5, IE-INRA-IC, 1997) used in Cheval Bien-Etre protocol as 1-5 point scale.

For donkeys, BCS developed by The Donkey Sanctuary, is presented in the AWIN welfare assessment protocol for donkeys. The assessment is performed visually and by palpation at the following anatomical sites:

- Neck and shoulders
- Back
- Ribs
- Rump
- Hindquarters.

The system involves 1-5 point scoring system.

Feeding recommendations for maintaining optimal BCS in broodmares

Maintaining optimal BCS requires careful nutritional management throughout the reproductive cycle and before the breeding season. For this purpose, the BCS scoring system specific to broodmares (Carroll and Huntington, 1988), included in the Welfare Monitoring System: Assessment Protocol for Horses, may be used. Feeding strategies should be tailored to the reproductive stage, individual metabolism, feed quality and energy balance. Special attention is needed during the winter period, as ovarian inactivity tends to last longer in mares that lose too much body condition.

At the time of mating, the mare (non-lactating) should be in good to very good nutritional condition (around 3-3.5 on a scale of 0 - 5 or around 5.5-6 on a scale of 1 - 9). Because mares naturally lose weight during lactation, they should foal while still gaining condition rather than already being overweight (at 4 on a scale of 0-5 and at 6 – 7 (on a scale of 1 – 9). Donkey´s ideal BCS is 3 on a scale 1 – 5 and 5 on a scale 1 – 9.

General Principles

- Forage first: High-quality hay or pasture should form the basis of the diet.
- Energy intake must match physiological demands:
  - Negative energy balance can delay follicular development and reduce conception rates.
  - Overconditioning increases the risk of metabolic disorders, oxidative stress, impaired placental function in the mare, and insulin resistance and musculoskeletal problems in the foal.
- Body condition should be monitored regularly, with adjustments made gradually over 6–8 weeks.

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REPRODUCTIVE STAGE	ENERGY REQUIREMENT	FEEDING NOTES
Pre-breeding	Slightly above maintenance	Achieve target BCS (≥3 on 0–5 scale) 3 months prior to breeding (Guillaume et al. 2006); 5 – 6 on 1 – 9 scale (NRC, 2007).
Early gestation (1st–2nd trimester)	Close to maintenance	Avoid excessive weight gain, support fetal organ development.
Late gestation (3rd trimester)	+10–20% above maintenance	Increased energy and protein demand due to fetal growth and placental development.
Lactation	Up to 2× maintenance	Highest nutritional demand – monitor weight loss and adjust concentrate intake as needed. Prioritize grazed grass before supplementation (when spring pasture is abundant (15–25 cm high) in well-watered areas, it can meet the lactating mare's nutritional needs).
Post-weaning / recovery	Moderate energy	Rebuild reserves before next breeding cycle and maintain BSC above 2.5 (scale 0-5) to limit ovarian inactivity during winter.

Avoiding feeding errors

- Do not restrict forage in underconditioned mares; supplement with energy-dense feeds if necessary.
- Avoid high-sugar/starch feeds in overconditioned mares to reduce the risk of metabolic disorders.
- Mineral balance is critical, especially Ca:P ratio and trace elements (Cu, Zn, and Zn/Cu ratio) for placental and fetal development.
- Ensure protein quality (amino acid profile) meets needs, especially in late gestation and early lactation. These requirements are generally covered by good-quality grazed grass.

Implementation Steps

1. Initial Assessment
    - Perform a full BCS evaluation of each broodmare during the winter period, at least three months before the planned start of the breeding season or insemination.
    - Use a standardized scoring system (e.g. 1 – 9 or 0 – 5 scale).
    - Document the starting condition and identify mares that are under- or overconditioned.

2. Set Target BCS
   - Define target BCS based on reproductive phase:
     - 3–3.5 (on a 0–5 scale) or 5–6 (on a 1–9 scale) before breeding
     - Maintain optimal BCS throughout gestation and lactation
   - Adjust feeding plans to reach target BCS gradually over 6–8 weeks if necessary.

3. Feeding Plan Implementation
   - Develop individual feeding plans based on forage quality, energy needs, and current BCS.
   - Include both quantitative (caloric) and qualitative (nutrient profile) aspects of the ration.
   - When possible, plan and manage grazing: schedule group turnout with the gradual introduction of lactating mares according to foal age, and implement rotational grazing to maintain abundant leafy grass availability (at least 20-30 kg DM/day/mare depending to the breed).
   - Ensure consistent access to clean water, salt, and balanced minerals.

4. Monthly Monitoring
   - Reassess the BCS at least once per month, ideally using the same trained observer for consistency.
   - Check for changes in weight and condition.
   - Record all observations and correlate with feeding data and reproductive stage

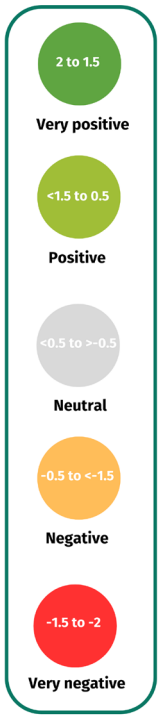
5. Adjust Feeding & Management
   - If a mare is gaining or losing weight too quickly, investigate any failure to gain or loss of condition for underlying issues:
     - Dental health
     - Metabolic disorders (e.g. PPID, insulin resistance)
   - Adjust:
     - Forage quality or quantity
     - Concentrate feed levels
     - Feeding frequency or group management (e.g. to reduce competition)

6. Evaluate Reproductive Outcomes
   - Correlate BCS trends with reproductive data:
     - Cycle regularity
     - Ovarian inactivity
     - Conception rates
     - Pregnancy maintenance
     - Foaling outcomes and foal vitality
   - Use this data to refine feeding and management protocols for future breeding seasons.

Maintaining a Healthy Body Condition Score in Breeding Mares

How Will this Solution Impact the Performance of your Farm ?

TOPIC	SCORE
Social	1.00
Economics	1.00
Welfare	1.00
Health	1.00
Environmental	0
Land access and management	2.00
Global	0.83



Color coding explanation

Socioeconomics: This solution will support the social performance of the farm because maintaining broodmares in good condition improves the public image and outreach of the farm. Regular monitoring also demonstrates professionalism and responsibility, while slightly increasing workload but under better and more controlled working conditions.

This solution will support the economic performance of the farm because improved breeding performance enhances profitability through healthier pregnancies and foal development. It also increases the value of mares in good condition, strengthening the farm's competitiveness and long-term financial stability. In addition, optimizing body condition and avoiding overweight can help reduce the overuse of expensive commercial concentrates, which are generally purchased feeds. Conversely, if a mare is undernourished and in poor body condition, her chances of becoming pregnant decrease, leading to an economic loss if no foal is born the following year.

Health & Welfare: This solution positively impacts the farm's overall health performance by helping to maintain optimal body condition, which is essential for efficient reproduction in mares. It may also help address possible ongoing health problems. However, it can affect the "3Fs," especially in cases of unlimited access to forage, which should be restricted for overweight individuals. Regular monitoring of the body condition score (BCS) can help support a positive emotional state, for example by preventing mares from becoming too thin and entering a state of starvation.

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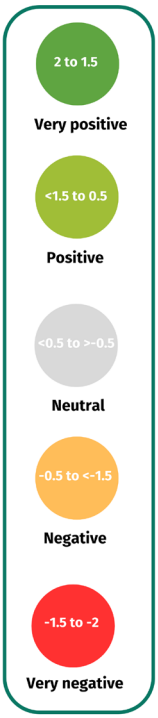
Environmental Sustainability: This solution will not have effect on the environmental performance of the farm because even though optimized feeding supports environmental sustainability, the effects at the farm level are quite small. However, when BCS monitoring iscombined with good pasture management practices, it can have a positive effect on environmental sustainability. Limiting overnutrition also helps reduce nitrogen and phosphorus excretion into the soil. This solution will support or weaken or not have effect on the land access or management performance of your farm because BCS monitoring helps to adapt quickly pasture management. strategies.

How Will this Solution Impact the Resilience of your Farm?

TOPIC	SCORE
Social	0.17
Economics	0.17
Welfare	0.58
Health	0.92
Environmental	0
Land access and management	0.83
Global	0.38



Socioeconomics: This solution will not impact social performance of the farm facing external challenges assessed because its influence on outreach and community perception is limited. Although it may show some alignment with higher welfare expectations, the overall effect on social resilience remains modest. This solution will not impact economic performance of the farm facing external challenges assessed because the benefits are situational and not decisive. It may support better decision-making and reduce health-related costs, but these effects are not strong enough to significantly influence overall resilience. However, farms that rely on forage and concentrates to maintain broodmare BCS will be more sensitive to inflation than those primarily using well-managed grazed grass resources.

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Health & Welfare: When the farm faces external challenges, this solution has a positive effect on the health performance of the farm, as it can reduce pain, mortality, and the need for medication since horses in good condition are more resistant to health problems.

Also, this solution will enhance the welfare performance of the farm when faced with external challenges since well-fed horses are satiated and in an optimistic emotional state.

Environmental Sustainability: This solution will not impact environmental performance of the farm facing external challenges assessed. However, in a case of inflation, pandemics and high welfare standards it allows farmer to make better decisions when number of horses and use of resources are planned.

This solution will support land access or management performance of the farm facing external challenges assessed because monitoring BCS can help to early detect pasture problems due to extreme climate event and adapt strategies accordingly.

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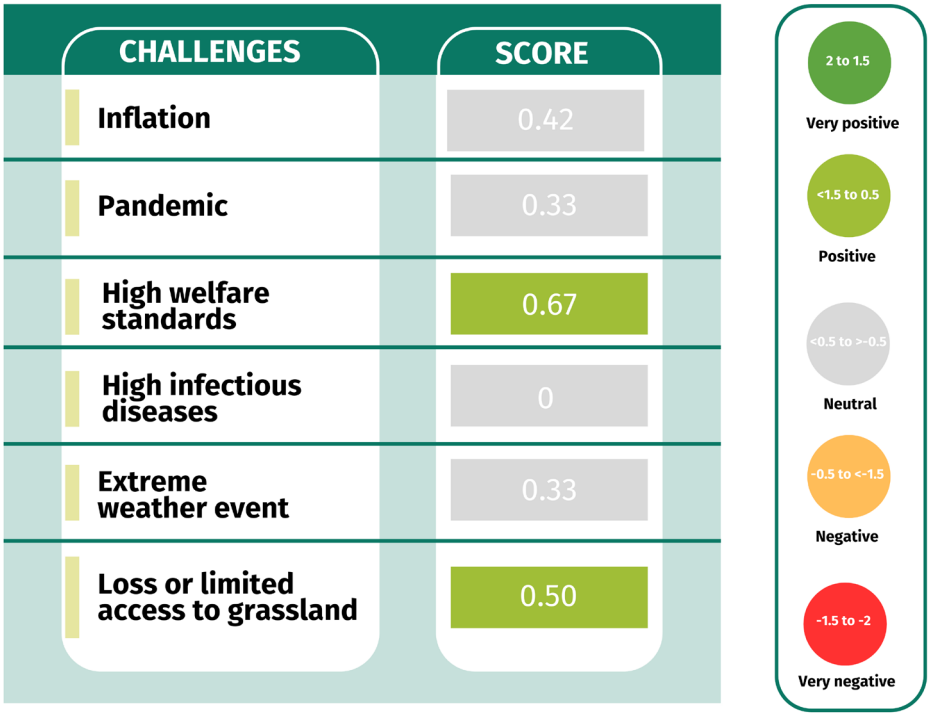
How Can this Solution Help your Farm Cope with Specific External Challenges to Become More Resilient?



Inflation & Social Crises: This solution will not impact the global performance of the farm facing inflation or pandemics because its contribution to overall resilience remains limited. While it may help optimize management decisions and reduce certain health-related costs, these effects are not strong enough to significantly improve the farm's socio-economic stability under such conditions.

Welfare & Diseases: This solution will not impact the global performance of the farm when facing infectious disease, but when high standards of welfare are compulsory, the farm may present the appropriate approach to feeding.

Climate Change & Access to Land: Environmental challenge: This solution will not impact the global performance of the farm facing extreme weather events because it is mainly about planning procedure. Monitoring BCS can help to early detect pasture problems, hence it can be used for prior planning, if farm is located on the area, in which extreme weather events occur frequently.

Land access/management challenge: This solution will support the global performance of the farm facing loss or limited access to agricultural land because it will help farm to change BCS can help to adapt land use strategies and plan feeding and number of horses in a new situation.

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Cost-Benefit Analysis

Costs

Socioeconomics:

- Additional effort for regular BCS assessment (e.g. monthly).
- Training required for employees in order to be able to assess uniformly.
- Possible short-term increase in costs for higher-value feed requirements (e.g. in build-up phases).
- Adjustments to group management or feeding system may be necessary.

Health & Welfare:

- Incorrect application (e.g. inconsistent assessment) can lead to incorrect feeding or other strategic decisions related to pasture management.

Environmental Sustainability :

- No costs.

Cooperation between farms:

- No comments.

Benefits

- Improved fertility → lower insemination costs per pregnant mare.
- Early adjustment of feeding prevents cost-intensive health problems.
- Feed is used in a more targeted and efficient manner → possible feed cost savings.
- Lower veterinary costs due to better general health.
- Structured documentation supports farm management.

- Contribute to improve reproductive performance.
- Prevention of secondary diseases caused by under- or overconditioning (e.g. laminitis or Equine metabolic syndrome (EMS)).
- Contribute to healthier foals, reduced early losses, higher foal vitality.
- Individual health monitoring is promoted.
- Impact on foal growth and health.

- Less feed wastage, lower slurry/ manure quantities

- No comments.

Additional Resources

Publications

- Carroll, C. L., & Huntington, P. J., 1988. Body condition scoring and weight estimation of horses. Equine veterinary journal, 20(1), 41-45. https://doi.org/10.1111/j.2042-3306.1988.tb01451.x
- Bradbery A.N., Coverdale J.A., Hammer C.J., Dunlap K.A., Leatherwood J.L., Satterfield M.C, 2021. Effect of maternal overnutrition on predisposition to insulin resistance in the foal: Foal intake muscle development and insulin signaling, Domestic Animal Endocrinology 77, 106648. https://doi.org/10.1016/j.domaniend.2021.106648
- D'Foncesa N.M.M, Gibson C.M.E., Hummel I., Van Doorn D.A., Roelfsema E., Stout T.A.E., Van den Broek J., Ruijter-Villani M., 2021. Overfeeding Extends the Period of Annual Cyclicity but Increases the Risk of Early Embryonic Death in Shetland Pony Mares. Animals 2021, 11, 361. https://doi.org/10.3390/ani11020361
- Fradinho, M.J., M.J. Correia, V. Grácio, M. Bliebernicht, A. Farrin, L. Mateus, R.J.B. Bessa, R.M. Caldeira, G. Ferreira-Dias, 2014. Effects of body condition and leptin on reproductive performances of Lusitano mares on extensive systems. Theriogenology. 81(9):1214-1222. https://doi.org/10.1016/j.theriogenology.2014.01.042
- Guillaume D, Salazar-Ortiz J, Martin-Rosset W. Effects of nutrition level in mares' ovarian activity and in equines' puberty. In: Miraglia N, Martin-Rosset W, editors. Nutrition and feeding of the broodmare. EAAP; 2006. p. 315–39.
- Henneke, D.R., Potter, G.D., Kreider, J.L., Yeates, B.F. 1983. Relationship between condition score, physical measurements and body fat percentage in mares. Equine Veterinary Journal, 15, 371-372.
- Henneke, D. R., Potter, G., & Kreider, J. L. 1984. Body condition during pregnancy and lactation and reproductive efficiency of mares. Theriogenology, 21(6), 897-909.
- INRA-HN-IE. 1997. Notation de l'état corporel des chevaux de selle et de sport. Guide Pratique. Paris, France: Institut d'Elevage
- Kienzle, E., Schramme, S. C. 2004. Body condition scoring and prediction of body weight in adult warm blooded horses. Pferdeheilkunde, 2004, Vol. 20, No. 6, 517-524 ref. 8 https://www.cabidigitallibrary.org/doi/full/10.5555/20043201624
- Kienzle, E., & Schramme, S. C., 2004. Beurteilung des Ernährungszustandes mittels body condition scores und Gewichtsschätzung beim adulten Warmblutpferd. Pferdeheilkunde, 20(6), 517-524.
- Morley S.A., Murray J.A, 2014. Effects of body condition score on the reproductive physiology of the broodmare: a review, Journal of Equine Veterinary Science 34 (2014) 842–853. https://doi.org/10.1016/j.jevs.2014.04.001
- NRC (2007). Nutrient requirements of horses (6ª ed.). Washington DC: National Academy Press.
- Pazinato FM, Curcio BDR, Fernandes CG, Santos CA, Feijó LS, Varela AS Jr , Nogueira CEW., 2016 . Histomorphometry of the placental vasculature and microcotyledons in Thoroughbred mares with chronic laminitis, Theriogenology, 10:12/2016, 77-81, https://doi.org/10.1016/j.theriogenology.2016.12.009
- Schramme, C. S., 2003. Body condition scores und biometrische Daten zur Abschätzung des Körpergewichts bei Warmblutpferden (Doctoral dissertation). https://edoc.ub.uni-muenchen.de/1522/1/Schramme_ClaudiaStephanie.pdf
- Smieszek A, Marcinkowska K, Pielok A, Sikora M, Valihrach L, Carnevale E, Marycz K. Obesity Affects the Proliferative Potential of Equine Endometrial Progenitor Cells and Modulates Their Molecular Phenotype Associated with Mitochondrial Metabolism. Cells. 2022; 11(9):1437. https://doi.org/10.3390/cells11091437
- Smith S., Marr C.M., Dunnett C., Menzies-Gow N.J., 2016. The effect of mare obesity and endocrine function on foal birthweight in Thoroughbreds, Equine Veterinary Journal, 49(4), 461-466. https://doi.org/10.1111/evj.12645
- Superchi, P., Vecchi, I., Beretti, V., Sabbioni, A., 2014. Relationship among BCS and fat thickness in horses of different breed, gender and age. Annual Research & Review in Biology, 4(2), 354. http://dx.doi.org/10.9734/ARRB/2014/6947

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Websites & Further Information

- German Language
  - https://www.bodyconditionscore.de/index.html
  - Schramm & Kienzle (2009) Zu dick, zu dünn oder gerade richtig? https://pferde.landwirtschaft-bw.de/site/pbs-bw-mlr-root/get/documents_E-113642557/MLR.LEL/PB5Documents/hul/Kompetenzzentrum%20Pferd/Fachinformationen%20Neu/Pferdegesundheit/%282009%29%20Zu%20dick,%20zu%20d%C3%BCnn%20oder%20gerade%20richtig%20-%20BCS.pdf
- English Language
  - BCS of Horses
    - https://edepot.wur.nl/238619
    - https://air.unimi.it/retrieve/dfa8b992-42a0-748b-e053-3a05fe0a3a96/AWINProtocolHorses.pdf
  - BCS of Donkeys
    - https://donkeyrescue.org/assets/Downloads/446fdef4e3/1209_001.pdf
    - https://www.thedonkeysanctuary.org.uk/sites/default/files/2024-08/donkey-body-condition-score-chart.pdf
    - https://air.unimi.it/retrieve/handle/2434/269100/384805/AWINProtocolDonkeys.pdf
- French Language
  - https://equipedia.ifce.fr/elevage-et-entretien/alimentation/nutrition-et-ration/evaluer-la-note-detat-corporel-de-son-cheval-une-necessite
  - https://equipedia.ifce.fr/bibliotheque/3._Guide__pocket_et_autres_pdf/3.2_Posters/Poster-note-etat-corporel.pdf
  - https://equipedia.ifce.fr/bibliotheque/3._Guide__pocket_et_autres_pdf/3.3_Depliants_pockets_guides/pocket-note-etat-corporel.pdf
  - https://equipedia.ifce.fr/fileadmin/bibliotheque/3._Guide__pocket_et_autres_pdf/3.6._Articles_equ_idee/equidee-evolution-pratiques-alimentaires-pour-conduite-plus-durable-equides-avril-2024.pdf

Video

- French Language: https://www.ifce.fr/ifce/connaissances/webconferences/elevage-et-entretien/complements-alimentaires-et-reproduction-que-sait-on/

Simulator

- French Language: https://simulation.ifce.fr/noteetatcorporel

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Annex

Ideas to Animate a Workshop About the Solution

- Ask an equine nutritionist or breeding veterinarian (e.g. from a feed company or advisory service) to sponsor or co-host the workshop.
- Find a model stud farm where BCS monitoring is already in place and that prioritizes pasture-based feeding and hold the workshop on-site.
- Complete the required tasks and let the participants take part in these demonstration tasks so tha
  - Provide a BCS worksheet ("BCS passport") for each participant to document and reflect on their scoring during the session.
  - Organize a "feed ration challenge" where small groups match nutritional plans to sample BCS cases.

Proposed Structure for the Workshop on Mantaining a Healthy BSC in Breeding Mares

1. Introduction to Body Condition Scoring (BCS)
- What is BCS and why does it matter in breeding mares?
- Overview of different scoring systems (0–5, 1–9).
- Tools and techniques for assessing BCS (visual + palpation).

2. Benefits of BCS Monitoring in Broodmare Management
- Improved reproductive efficiency (shorter time to conception, fewer cycles).
- Better foal health and vitality.
- Reduced incidence of metabolic diseases.
- Cost savings through targeted nutrition.
- Supports staff in early identification of risks.

3. Practical Applications on Horse Farms
- When and how often to score: key reproductive phases.
- Who should score? Importance of trained, consistent evaluators.
- Integration of BCS with feeding plans and breeding calendars.
- Documentation and monitoring methods (manual/digital).

4. How to Implement a BCS-Based Management System
- Evaluate current feeding and breeding practices.
- Assess staff knowledge and training needs.
- Choose a scoring system and standardize across the team.
- Develop a protocol for regular assessments and adjustments.
- Align feed planning with condition targets.

5. Hands-On Demonstration
- Live demonstration with broodmares (if possible).
- Participants perform BCS scoring in small groups.
- Compare results and discuss differences.
- Optional: scoring on video or using models if live horses are not available.

6. Maintainance and Troubleshooting
- How to react to under- or overconditioned mares.
- Adjusting feeding plans safely and effectively.
- Tracking progress over time.
- Avoiding common errors (e.g. overreliance on visual cues, group scoring bias).

7. Case Studies and Field Examples
- Present examples from farms using regular BCS monitoring.
- Share data on improved conception rates, healthier foals.
- Operator insights: what worked, what didn't.

8. Cost Analysis and Return on Investment (ROI)
- Initial investments (training time, documentation tools).
- Long-term savings through improved breeding outcomes and feed efficiency.
- Non-monetary benefits: animal welfare, team communication, predictability.

9. Q&A Session
- Space for participants to share experiences.
- Address practical concerns or conflicting advice in the field.
- Exchange tips and tools.

10. Wrap-Up and Resources
- Summary of key messages and implementation steps.
- Hand out resources: scoring charts, example protocols, ration planning tools.
- Optional: access to follow-up webinar, helpline, or online resource portal.
- If applicable: voucher or contact with sponsor/feed consultant.