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DAIRY CALF PNEUMONIA: EFFECTIVE TREATMENT DEPENDS ON EARLY AND ACCURATE DIAGNOSIS*
PNEUMONIJA KOD TELADI: EFIKASAN TRETMAN ZAVISI OD RANE I PRECIZNE DIJAGNOZE

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Dairy calf pneumonia is one of the most economically important diseases of calves. A delayed diagnosis could result endemic herd problem, prolonged use of antibiotics, high recurrence rate, pulmonary abscessation and ear infections. The key for effective control is the early detection of pneumonia and the accurate diagnosis of the etiologic factor. For the early detection, a respiratory disease score was assigned based on rectal temperature, character of nasal discharge, eye discharge or ear appearance, and presence of a cough. Each clinical sign has a point scale from 0 (normal) to 4 (severe). The respiratory disease score is the sum of points from the 4 categories of clinical signs, with increasing values representing progressive severity. The scoring system results in a minimum score of 0 and a maximum score of 12. Calves with score 5 or higher, having at least 2 clinical signs of respiratory disease, are considered sick and have to be treated. For the accurate diagnosis of the etiological agent the best tool in a live calf is bronchoalveolar lavage (BAL) fluid collection. Sampling of severely affected animals should be avoided. New acute cases are ideal. BAL is performed in sedated calves using a sterilized, flexible catheter with a 5-cc balloon cuff. The fresh BAL fluid sample is processed within 2 hours of collection or refrigerated until analysis. Part of the sample is used for microbiology and the remaining is submitted for cytology. BAL fluid that yields homogenous ($>10^6$ CFU/ml) bacterial or positive Mycoplasma bovis culture is considered abnormal. A disproportionate lowering of macrophages ($<61\%$) or elevation of neutrophils ($>39\%$) provides evidence of an inflammatory response with or without a positive

culture. The ideal antibiotic selection would be based on the antibiotic susceptibility pattern of lung pathogens after BAL fluid culture.

Key words: calves, respiratory scoring system, bronchoalveolar lavage

Introduction / *Uvod*

In literature, there is a plethora of papers concerning the etiology and pathogenesis of calf pneumonia. The scope of this article is to focus on methods that will allow early detection and accurate diagnosis of dairy calf pneumonia, which in turn will lead to more effective treatment.

Dairy calf pneumonia, either pre- or post-weaning, is considered as one of the most economically important diseases of calves due to death losses, debilitation and reduced performance of the animals, cost of treatment and labor. Although it is typically viewed as a post-weaning problem, its origin and the opportunity for a successful intervention is the pre-weaning period.

Risk Factors / *Faktori rizika*

As for most diseases of pre-weaned calves, failure of passive transfer of immunity (FPT) through colostrum is a major risk factor for pneumonia. Not only are FPT calves more susceptible to respiratory disease, but, even in the absence of disease, they shed pathogens at a higher rate than their immune peers. Environmental shedding can result in high aerosolized bacterial counts in calf barns and hutches, particularly post-weaning, when there is over-crowding, continuous animal occupancy, prolonged calf to calf contact (spatial and temporal density), poor ventilation (Radostits *et al*., 2000; Callan and Garry, 2002), cold environment, high humidity and damp floor or bedding. Also, stress (arising from inadequate nutrition, water availability, medication and vaccinations allowance), concomitant poor health (due to diseases such as BVD and Bovine Leukocyte Adhesion Deficiency) and sudden weather changes can increase the occurrence of dairy calf pneumonia. Other high risks for pneumonia population is transported calves, commingled calves from different sources and ages and unvaccinated animals. Calves fed non-pasteurized waste milk or colostrum from cows with *Mycoplasma bovis* mastitis will also be at high risk of exposure. With high exposure rates, calves made susceptible by the afore-mentioned risk factors will have endemic respiratory disease (McGuirk, 2005).

Diagnosis / *Dijagnoza*

Early diagnosis, which favours effective treatment, of dairy calf pneumonia will eliminate most herd problems. A delayed diagnosis could result in incomplete treatment and prolonged use of antibiotics, high recurrence rate, pulmonary abscessation (chronic condition) and high incidence of otitis cases. As a

result, the affected-uncured calves enter the weaning pens and could lead to endemic herd problem.

The keys for effective pneumonia control are the early detection (clinical diagnosis) and the accurate identification of the causative agents (with the implementation of ancillary tests).

1. Clinical diagnosis

The clinical signs of fever, nasal discharge, lacrimation, cough, increased respiratory rate, depression, reduced appetite, rough hair coat, weight loss and abnormal lung sounds rarely occur together, may be absent in early cases of pneumonia, are easily overlooked by caretakers, and require time and advanced knowledge to detect, even for clinicians (McGuirk, 2005). Farmer diagnosis of pneumonia fails to identify as many as 50% of affected calves and, when identified, is typically 4 to 5 days after onset (Virtala *et al*., 1996; Quimby *et al*., 2001). Better indicators in the very early stages of pneumonia are the prolonged time the calves spend in the buckets and the longer standing after drinking.

Since the criteria used in the field are poor predictors of disease, early diagnosis of dairy calf pneumonia is frequently missed, along with the opportunity to make effective treatment interventions or recognize important herd problems before significant losses are incurred.

A simple and practical respiratory scoring system for early detection of pneumonia in dairy calves individually has been validated (McGuirk *et al*., 2007). At best, when implemented regularly twice weekly in pre-weaned calves kept in single pens, it has been the most effective tool in eliminating endemic pneumonia. At least, it should be performed at critical times, such as at the pneumonia onset in a farm or just before weaning. It is based on: 1. rectal temperature, 2. the character of nasal discharge, 3. eye or ear appearance, and 4. presence of a cough (McGuirk, 2005). As it is shown in Table 1 (Lago *et al*., 2006), the respiratory disease score is the sum of points from the 4 categories of clinical signs, with increasing values representing progressive severity.

Eyes and ears are evaluated but only the highest value is entered into the score. For example, if the eye score is 1 and the ear score is 2, the ear score of 2 is entered. The scoring system results in a minimum score of 0 and a maximum score of 12. The total score determines the outcome. Calves with score 5 or higher have at least 2 clinical signs of respiratory disease, and thus are considered sick and have to be treated (McGuirk, 2005; Lago *et al*., 2006).

2. Ancillary diagnostic tests

It is widely accepted that the most commonly isolated microorganisms in dairy calves respiratory disease complex are the following:

a. Bacteria: *Pasteurella multocida, Mannheimia haemolytica, Histophilus somni, Mycoplasma bovis, Mycoplasma dispar* and the non-primary pathogens *Actinomyces pyogenes.*

179

b. Viruses: *Bovine respiratory syncytial virus - BRSV* (mainly)*, Infectious bovine rhinotracheitis virus – IBR, Bovine virus diarrhea virus - BVDV* and *Parainfluenza-3 virus -PI$_3$.*

Many of them are normal flora of the upper respiratory tract (Watts *et al*., 1994), but they introduce respiratory disease when they colonize the lower respiratory tract (trachea and lungs) (Divers, 2008).

Seroconversion to a specific viral respiratory pathogen has considerable drawbacks with time delays to obtain convalescent samples and concomitant seroconversion to infectious agents that have not caused the disease (Pringle, 1992).

The diagnostic techniques that could be applied to collect the appropriate samples in order to identify the microorganisms involved are: nasal swab, trans-tracheal wash and bronchoalveolar lavage (BAL) fluid collection. Transtracheal washing obtains samples from the lower respiratory tract bypassing the nasopharynx (Pringle, 1992), but is the most difficult to implement in the field as it requires surgical preparation of the ventral surface of the neck. Due to the more invasive nature it is less suitable for routine field investigations (Caldow, 2001). Nasal swab is easy to perform and particularly useful in detecting acute viral infections, such as IBR; it can also be an indirect indicator of pathogens in the lower respiratory tract (Pringle, 1992). The concern is that, as mentioned above, many of the isolated microorganisms are just normal commensals of the upper respiratory tract (Caldow, 2001). However, they can be successfully used for an antibiogram in group level (multiple cases). For the accurate diagnosis of the etiological agent in a live calf (either in field or in clinic), the best tool is the BAL fluid collection. It requires a little training, but is safe and efficient. Although it can be performed using fiberoptic endoscopes, more rudimentary equipment (commercially available catheters) can successfully be used (Pringle, 1992; Caldow, 2001; Jackson and Cockcroft, 2002).

Sampling of severely affected animals should be avoided, because of the added stress caused by the procedure. New acute cases, before any antibiotic allowance, are ideal. This technique is usually used when there has been an outbreak of pneumonia with high morbidity. In order to obtain an accurate profile of the etiological agent it is advisable to select up to five animals for sampling (Jackson and Cockcroft, 2002).

BAL is performed in sedated calves using a sterilized, flexible 10 French x 36 inch catheter with a 5-cc balloon cuff (Urinary catheters, Foley catheters, Mila International Inc., Medical Instrumentation for Animals, Florence KY, USA). Five to 10 minutes after administration of 0.1 mg/kg xylazine IM, the sedated calf is restrained and the nostrils are cleaned with a dry gauze sponge. The head and neck of the calf are extended to facilitate passage of the sterile BAL catheter by a person wearing surgical gloves. Prior to catheter introduction into the nostril, sterile saline is dripped into the catheter to lubricate the guide-wire stylette. The BAL catheter is introduced into the ventral meatus of the nose through

which it is advanced until it encounters resistance in the caudal pharynx. At that point, the restrainer pushes the poll of the calf's head ventrally while simultaneously elevating the ventral mandible and the catheter is advanced down the trachea during the inspiratory phase of the respiratory cycle (McGuirk and Peek, 2007).

Repeated coughing is induced with proper catheter placement. The catheter is rapidly advanced until resistance is met as it wedges in a cranial lung lobe bronchus. Failure to induce spontaneous coughing subsequent to passage beyond the pharynx usually implies passage into the esophagus. In the wedged position, the catheter is held firmly in place while the guide-wire stylette is removed. The balloon cuff is then inflated with 5 cc of air and 120 ml of sterile saline is infused using 60 ml syringes with a stopcock and catheter tipped adapter attached. Immediately after the 120 ml infusion, negative pressure is applied to aspirate fluid, a process that usually yields 10 to 40 ml of clear to mildly turbid, foamy fluid. The returned fluid sample is placed into a sterile 120 g specimen cup. A second 120 ml infusion is introduced and aspirated as described and the pooled fluid is sealed in the specimen cup and preserved in a cooler until it can be processed (McGuirk and Peek, 2007).

The fresh BAL fluid sample is processed within 2 hours of collection or refrigerated until it can be analyzed. A 5 ml aliquot of the pooled sample is used for bacteria cultures and identification of viral antigens. The remaining fluid is submitted for cytological interpretation, which is based on routine staining of cytospin and direct smear preparations (Jackson and Cockcroft, 2002). Organisms that have been found in association with disorders of the respiratory tract, alone or in combination, from BAL fluid samples of dairy cattle are *Mycoplasma bovis, Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni* and *Salmonella dublin*, IBR, BRSV and PI$_3$ (Tegtmeier *et al*., 1999; Kokotovic *et al*., 2007). BAL fluid that yields homogenous (>10^6 CFU/ml) bacterial or positive *Mycoplasma bovis* culture is considered abnormal. Cells in BAL of the normal cattle are predominantly alveolar macrophages (Pringle, 1992). A disproportionate lowering of macrophages (<61%) or elevation of neutrophils (>39%) provides evidence of an inflammatory response with or without a positive culture (McGuirk and Peek, 2007).

Treatment / *Tretman*

Respiratory disease is treatable in calves that score 5 points or more using the Calf Respiratory Scoring System (Table 1). Calves with a score of 5 or more should be treated with an antibiotic protocol that provides 5-6 days of coverage. At the end of the 5-6 days treatment protocol, the calf is scored again. If the respiratory score is 3 or lower, the calf is considered cured and no further treatment is needed. If the calf is scored 4, it should be rechecked the following day. Persistence of score 4 warrants a second course of the antibiotic. Score 5 or higher should enter a second protocol (McGuirk, 2007).

Table 1. Scoring system for calf respiratory disease /
Tabela 1. Bodovni sistem za respiratornu bolest teladi

Clinical sign / *Klinički znak*	Points allocated for signs below / *Bodovi za navedene znake*			
	0	1	2	3
Rectal temperature / *Rektalna temperatura* (°C)	37.8 – 38.2	38.3 – 38.8	38.9 – 39.3	≥39.4
Cough / *Kašalj*	None / *Bez*	Induced single cough / *Izazvano jedno nakašljavanje*	Induced repeated or occasional spontaneous cough / *Izazvan ponovljen ili povremeni spontani kašalj*	Repeated spontaneous cough / *Ponovljen spontani kašalj*
Nasal discharge / *Iscedak iz nosa*	Normal serous / *Normalno serozan*	Small amount of unilateral, cloudy discharge / *Mala količina unilateralnog zamućenog iscetka*	Bilateral, cloudy or excessive mucus discharge / *Obostrani, zamućen ili obilan mukozan iscedak*	Copious bilateral, mucopurulent nasal discharge / *Obilan obostran mukopurulentan nosni iscedak*
Eye / *Oko*	Normal / *Normalno*	Small amount of ocular discharge / *Mala količina očnog iscetka*	Moderate amount of bilateral purulent ocular discharge / *Umerena količina obostranog gnojnog očnog iscetka*	Heavy amount of bilateral purulent ocular discharge / *Gust obostrani gnojni očni iscedak*
Ear / *Uho*	Normal / *Normalno*	Ear flick or head shake / *Treperenje ušiju i otresanje glave*	Unilateral slight ear drop / *Jednostrana klempavost uha*	Head tilt or bilateral ear drop / *Nagnuta glava ili obostrana klempavost ušiju*

The response to treatment depends on early detection, correct choice
of antibiotic, activity of drug at site of lesion, penetration of drug into exudate and
route, dose and duration of therapy. The ideal antibiotic selection would be based
on the antibiotic susceptibility pattern of lung pathogens preferably after BAL fluid
culture (for individual cases and in group level) or alternatively, if BAL is difficult or
impossible to perform, nasal swabs culture. In an individual calf, nasal swabs cul-
ture do not accurately predict BAL culture. The nasal swabs and BAL culture re-
sults are quite similar at group level, however (Allen *et al*., 1991; Caldow, 2001).

From information that has gained culturing BAL fluid or nasal swabs
collected from many farms with dairy calf pneumonia in Wisconsin USA, it is an-
ticipated that the following antibiotics will be effective in calves with pneumonia
that are diagnosed early (McGuirk, 2007):

1) Ceftiofur: 2.2 mg/kg IM, frequency: once per day for 5 days;

2) Oxytetracyline L.A. 200: there is resistance now for P. multocida and
M. haemolytica. Dose: 20 mg/kg SC, frequency: once per day, every other day for
5 days (3 doses);

3) Florfenicol: 40 mg/kg SC, frequency: once every other day for 3
doses (6 day total course of treatment);

4) Tilmicosin: 10 mg/kg SC, frequency: once per day, every third day
for 5 days (2 doses);

5) Tulathromycin: 2.5 mg/kg SC, frequency: once per day, every third
day for 5 days (2 doses).

When *Mycoplasma bovis* is cultured from <17% of the nasal swab cul-
tures, it is presumed that it is not the primary etiologic agent and antibiotic selec-
tion is based on susceptibility results from positive (>10^6 cfu/ml) BAL cultures
and/or the susceptibility patterns of *Pasteurella multocida, Mannheimia haemo-
lytica* and *Histophilus somni* isolates from the nasal swabs (McGuirk, 2005). The
composite nasal swab antibiotic susceptibility results from herds with concurrent
dairy calf pneumonia and otitis in a 2005 survey are shown in Table 2.

Table 2. *Antibiotic susceptibility of nasal swab bacterial isolates* /
Tabela 2. Osetljivost na antibiotike bakterija izolovanih iz brisa nosa

Bacteria / *Bakterije*			
Antibiotic / *Antibiotik*	Pasteurella multocida	Mannheimia haemolytica	Histophilus somni
Ampicillin/Amoxicillin	Sensitive / *Osetljiva*	Resistant / *Rezistentna*	Resistant / *Rezistentna*
Ceftiofur	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*
Florfenicol	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*
Spectinomycin	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*	Incomplete / *Nepotpuna*
Tetracycline	Resistant / *Rezistentna*	Resistant / *Rezistentna*	Incomplete / *Nepotpuna*
Trimethoprim sulfa	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*
Tilmicosin	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*	Sensitive / *Osetljiva*

Mycoplasma susceptibilities are not performed routinely in many laboratories. Field strain resistance is problematic leaving only the 3 fluoroquinolones (danofloxacin, enrofloxacin and marbofloxacin) with consistent efficacy (Francoz *et al*., 2005; Thomas *et al*., 2003). Tiamulin has demonstrated efficacy against most *M. bovis* field isolates (Thomas *et al*., 2003; Hirose *et al*., 2003). *M. bovis* is less susceptible to spiramycin, oxytetracycline, tetracycline, tylosin, lincomycin, florfenicol, gentamycin and spectinomycin (Loria *et al*., 2003; Hirose *et al*., 2003; Francoz *et al*., 2005). Erythromycin and tilmicosin resistance to *M. bovis* has been found by some, while tylosin effectiveness has been noted by others (ter Laak *et al*., 1993; Ayling *et al*., 2000; Loria *et al*., 2003; Francoz *et al*., 2005).

Of course, it is important to notice that the appropriate treatment for respiratory diseases is subdivided in 2 major parts: the "etiological" therapy (antibiotic allowance against bacteria) and the "supportive" therapy, which is very important to implement. The latter mainly consisted of (Divers, 2008):

1. Non-steroid anti-inflammatory drugs (preferably) or corticosteroids (once): to reduce fever, inflammation and pain and for their action against endotoxinosis (mainly is caused by *M. haemolytica* infection);

2. Fluids and electrolytes IV: to restore dehydration and to correct the electrolyte imbalances (respiratory alkalosis or acidosis);

3. Bronchodilators;

4. Mucolytics.

Furthermore, injection of vitamin E and selenium would be beneficial, for their antioxidant properties and boosting of immunity.

Finally, it is very important to remember the vital role ventilation plays for the respiratory disease complex of dairy calves. In any case, ventilation deficiencies should be corrected.

References / *Literatura*

1. Allen JW, Viel L, Bateman KG, Rosendal S, Shewen PE, and Physick-Sheard P. The microbial flora of the respiratory tract in feedlot calves: associations between nasopharyngeal and bronchoalveolar lavage cultures. Can J Vet Res 1991; 55(4): 341-6.

2. Ayling RD, Baker SE, Nicholas RAJ, Peek ML, Simon AJ. Comparison of *in vitro* activity of danofloxacin, florfenicol, oxytetracycline, spectinomycin and tilmicosin against recent field isolates of *Mycoplasma bovis*. Vet Rec 2000; 146(26): 745-7.

3. Caldow G. Bronchoalveolar lavage in the investigation of bovine respiratory disease. In Practice 2001 (Jan); 41-3.

4. Callan RJ, Garry FB. Biosecurity and bovine respiratory disease. Vet Clin N Am - Food A 2002; 18: 57-77.

5. Divers T. Respiratory diseases. In: Diseases of dairy cattle, 2nd edition, Divers T. and Peek S. (eds), Saunders Elsevier 2008: 79-129.

6. Francoz D, Fortin M, Fecteau G, Messier S. Determination of Mycoplasma bovis susceptibilities against six antimicrobial agents using the E test method. Vet Microbiol 2005; 105(1): 57-64.

7. Hirose K, Kobayashi H, Ito N, Kawasaki Y, Zako M, Kotani K, Ogawa H, Sato H. Isolation of Mycoplasmas from nasal swabs of calves affected with respiratory diseases and antimicrobial susceptibility of their isolates, J Vet Med B 2003; 50: 347-51.

8. Jackson P, Cockcroft P. Clinical examination of the respiratory system. In: Clinical examination of farm animals, Jackson P. and Cockcroft P. (eds), Blackwell Science Ltd 2002: 65-79.

9. Kokotovic B, Friis NF, Ahrens P. Mycoplasma alkalescens demonstrated in bronchoalveolar lavage of cattle in Denmark. Acta Vet Scand 2007; 49: 2.

10. Lago A, McGuirk SM, Bennett TB, Cook NB, Nordlund KV. Calf Respiratory Disease and Pen Microenvironments in Naturally Ventilated Calf Barns in Winter. J Dairy Sci 2006; 89: 4014-25.

11. Loria GR, Sammartino C, Nicholas RAJ, Ayling RD. *In vitro* susceptibilities of field isolates of *Mycoplasma agalactiae* to oxytetracycline, tylosin, enrofloxacin, spiramycin and lincomycin-spectinomycin. Res Vet Sci 2003; 75(1): 3-7.

12. McGuirk SM. Otitis media in calves. In Proc 23rd Am Coll Vet Intern Med, Baltimore, MD, 2005: 228-30.

13. McGuirk SM. Sick calf protocols. University of Wisconsin – Madison, School of Veterinary Medicine, personal communication, 2007.

14. McGuirk SM, Peek SF. BAL Collection in Cows and Calves. University of Wisconsin – Madison, School of Veterinary Medicine, personal communication, 2007.

15. McGuirk SM, Peek SF, Nordlund KV. Respiratory scoring system to improve early detection. University of Wisconsin – Madison, School of Veterinary Medicine, personal communication, 2007.

16. Pringle JK. Ancillary testing for the ruminant respiratory system. Vet Clin N Am - Food A, 1992; 8(2): 243-56.

17. Quimby WF, Sowell BF, Bowman JGP, Branine ME, Hubbert ME, Sherwood HW. Application of feeding behavior to predict morbidity of newly received calves in a commercial feedlot. Can J Anim Sci 2001; 81: 315-20.

18. Radostits OM, Gay CC, Blood DC, Hinchcliff KW. Diseases of the respiratory system. In: Veterinary Medicine, 9th ed., W. B. Saunders, 2000: 1160-8.

19. Tegtmeier C, Uttenthal A, Friis NF, Jensen NE, Jensen HE. Pathological and microbiological studies on pneumonic lungs from Danish calves. J Vet Med 1999; 46:693-700.

20. Ter Laak EA, Noordergraaf JH, Verschure MH. Susceptibilities of Mycoplasma bovis, Mycoplasma dispar, and Ureaplasma diversum strains to antimicrobial agents in vitro. Antimicrob Agents Chemother 1993; 37(2): 317-21.

21. Thomas A, Nicolas C, Dizier I, Mainil J, Linden A. Antibiotic susceptibilities of recent isolates of *Mycoplasma bovis* in Belgium. Vet Rec 2003; 153(14): 428-31.

22. Virtala A-MK, Mechor GD, Grohn YT, Erb HN, Dubovi EJ. Epidemiologic and pathologic characteristics of respiratory tract disease in dairy heifers during the first three months of life. J Am Vet Med A 1996; 208: 2035-42.

23. Watts JL, Yancey RJ, Sarah JR, Salmon SA, Case CA. A 4-year survey of antimicrobial susceptibility trends for isolates from cattle with bovine respiratory disease in North America. J Clin Microbiol 1994; 32: 725-31.

SRPSKI

PNEUMONIJA KOD TELADI: EFIKASAN TRETMAN ZAVISI OD RANE I PRECIZNE DIJAGNOZE

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Pneumonija kod teladi je jedna od ekonomski najvažnijih bolesti goveda. Zakasnela dijagnoza mogla bi da izazove endemski problem kod stada, da rezultira u prolongiranoj upotrebi antibiotika, visokom stepenu ponovnog javljanja, pulmonarnim abcesima i infekcijama uha. Ključ za efikasnu kontrolu je rana detekcija pneumonije i precizna dijagnoza etiološkog faktora. U cilju ranog otkrivanja bolesti, određeno je bodovanje respiratorne bolesti na osnovu rektalne temperature, karaktera nazalnog iscedka, iscedka iz oka ili izgleda uha, kao i prisustva kašlja. Svaki klinički znak ima skalu bodova od 0 (normalno) do 4 (teško). Bodovanje respiratorne bolesti predstavlja zbir bodova za 4 kategorije kliničkih znakova, tako što povećane vrednosti predstavljaju progresivno ozbiljnije stanje. Bodovni sistem može dati minimalni rezultat od 0 bodova ili maksimalni rezultat od 12 bodova. Telad bodovana sa 5 ili više, kod kojih je prisutno najmanje dva klinička znaka respiratorne bolesti, smatraju se bolesnim i treba da dobiju terapiju. Najbolje sredstvo za preciznu dijagnozu etiološkog agensa kod živih taladi je sakupljanje tečnosti bronhoalveolarnom lavažom (BAL). Treba izbegavati uzimanje uzoraka od teško obolelih životinja. Idealni su novi akutni slučajevi. BAL se vrši kod sedirane teladi koristeći sterilizovan i fleksibilan kateter sa vazdušnim jastučetom od 5 kubnih centimetara. Sveži uzorak BAL tečnosti se obrađuje u roku od 2 sata od sakupljanja ili ostavlja u frižideru dok se ne pristupi analizi. Deo uzorka se koristi za mikrobiološka ispitivanja a ostatak za citološka ispitivanja. Rezultat se smatra abnormalnim kada BAL tečnost pokaže homogenu ($>10^6$ CFU/ml) bakterijsku ili pozitivnu kulturu *Mycoplasma bovis*. Disproporcionalno smanjenje makrofaga ($<61\%$) ili povećanje neutrofila ($>39\%$) pruža dokaze o postojanju inflamatornog odgovora sa ili bez pozitivne kulture. Idealna antibiotska selekcija bila bi bazirana na antibiogramu za plućne patogene na osnovu kulture BAL tečnosti.

Ključne reči: telad, respiratorni bodovni sistem, bronhoalveolarna lavaža

РУССКИЙ

ПНЕВМОНИЯ У ТЕЛЯТА: ЭФФЕКТИВНОЕ ЛЕЧЕНИЕ ЗАВИСИТ ОТ РАННЕГО И ТОЧНОГО ДИАГНОЗА

N. Panousis

Пневмония у телята одна из экономически самых важных болезней крупного рогатого скота. Опоздавший диагноз мог бы вызвать эндемическую проблему у стад, являеться результатом в пролонгированном употреблении антибиотиков, высокой степени повторного появления, пульмонарных абсцессах и ушных инфекциях. Ключ для эффетивного контроля ранняя детекция пневмонии и точный диагноз этиологического фактора. С целью раннего открытия болезни, определен счёт очков респираторной болезни на основе реклтальной температуры, характера назального экстракта, экстракта из глаза или вида уха, словно и писутствие кашля.

Каждый клинический знак имеет шкалу очков от 0 (нормально) до 4 (тяжело). Счёт очков респираторной болезни представляет собой сумму очков для 4 категорий клинических знаков, так, что увеличенные стоимости представляют собой прогрессивное более серьёзное состояние. Бальная система может дать минимальный результат от 0 баллов или максимальный результат от 12 баллов. Телята, считанные баллами с 5 или бóльше, у которых присутствующее меньше всего два клинических знака респираторной болезни, считаются больными и им надо получить терапию. Наилучшее средство для точного диагнза этиологического агента у живых телят накапливание жидкости бронхоальвеолярной лаважой (БАЛ). Надо избегать принимание образчиков от тяжело заболевших животных. Идеальные новые острые случаи. БАЛ совершается у седиранных телят, пользуя стерилизованный и флексибильный катетер с воздухоносным мешком от 5 кубических сантиметров. Свежий образчик БАЛ жидкости обрабатывается в течение от двух часов от накопления или оставляет в холодильнике пока не приступится анализу. Часть образчика пользуется для микробиологических испытаний. Результат считается ненормальным, когда БАЛ жидкость покажет гомогенную (>10^6 ЦФУ/мл) бактериальную или положительную куольтуру *Mycoplasma bovis*. Диспропорциональное уменьшение макрофагов (<61%) или увеличение нейтрофилов (>39%) оказывает доказательства о существовании инфламматорного ответа с или без положительной культуры. Идеальная антибиотическая селекция была бы базирована на атибиотикограмме для лёгочных патогенов на основе культуры БАЛ жидкости.

Ключевые слова: телята, респираторная бальная система, бронхоальвеолярная лаважа